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MANUAL OF PHYSICAL GEOGRAPHY AND INSTITUTIONS OF THE State of Iowa.

BY

C. A. WHITE

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DAVENPORT, IOWA:
DAY, EGBERT, & FIDLAR.
1873.

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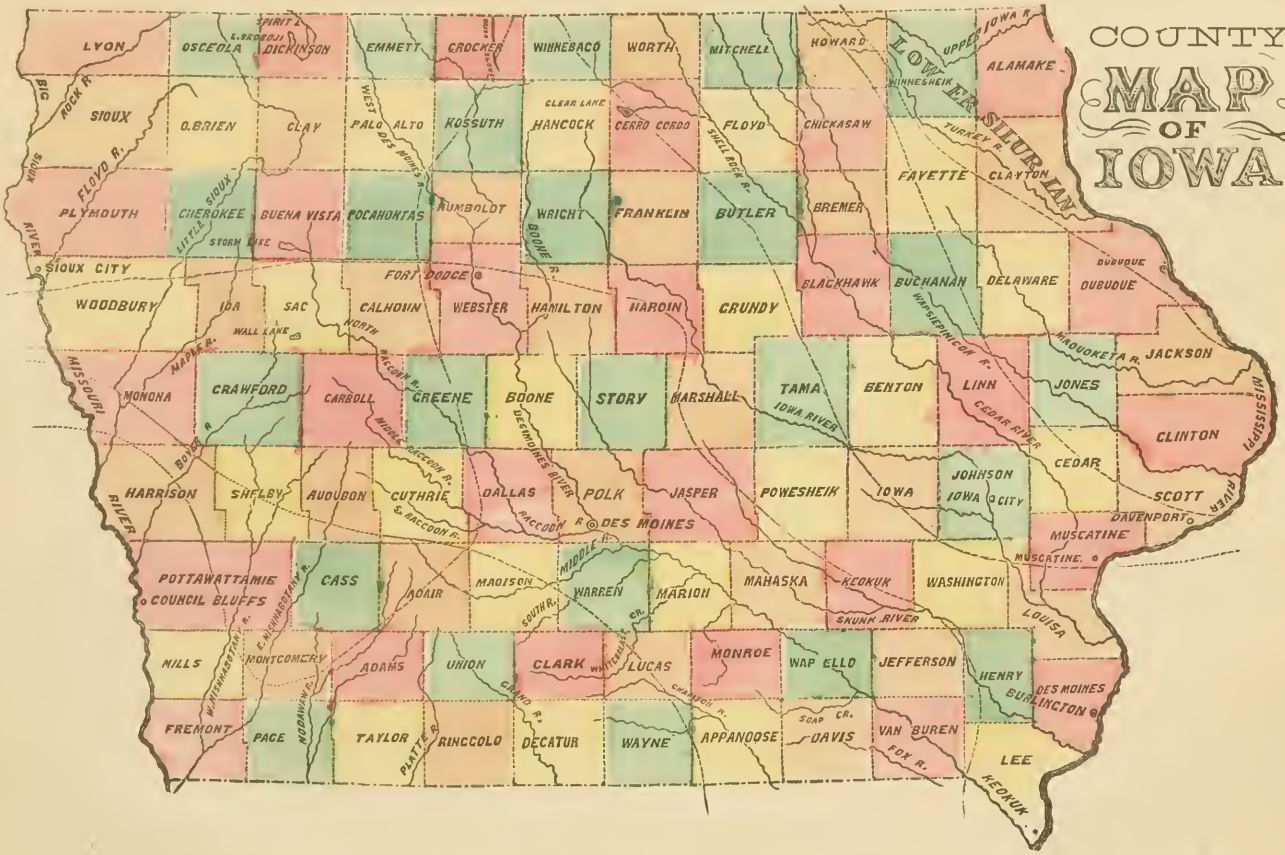
COUNTY
MAP
OF
IOWA
LYON
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HOWARD
ALAMAKE
SIOUX
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CERRO GORDO
FLOYD
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FAYETTE
CLAYTON
PLYMOUTH
CHEROKEE
BUENA VISTA
POCAHONTAS
HUMBOLDT
WRIGHT
FRANKLIN
BUTLER
BREMER
BUCHANAN
DELAWARE
DUBUQUE
SIOUX CITY
FORT DODGE
WOODBURY
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HAMILTON
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GRUNDY
BLACKHAWK
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MAQUOKETA R.
JACKSON
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
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MARSHALL
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SHELBY
AUDUBON
GUTHRIE
DALLAS
POLK
DES MOINES
JASPER
POWESHEIK
IOWA
JOHNSON
CEDAR
SCOTT
DAVENPORT
MUSCATINE
POTTAWATTAMIE
COUNCIL BLUFFS
CASS
ADAIR
MADISON
WARREN
MARION
MAHASKA
KEOKUK
WASHINGTON
LOUISA
SKUNK RIVER
NILLS
MONTGOMERY
ADAMS
UNION
CLARK
LUCAS
MONROE
WAPELLO
JEFFERSON
HENRY
DES MOINES
BURLINGTON
FREMONT
PAGE
TAYLOR
RINGGOLD
DECATUR
WAYNE
APPANOOSE
DAVIS
VAN BUREN
LEE
KEOKUK
MISSOURI RIVER
MISSISSIPPI RIVER
IOWA RIVER
CEDAR RIVER
BOYER R.
NISHNABOTNA R.
NODAWAY R.
PLATTE R.
CHANO R.
CHARITON R.
WHITE BREAST CR.
SOAP CR.
FOX R.
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FLOYD R.
ROCK R.
BIG SIOUX RIVER
MAPLE R.
NORTH RACCOON R.
MIDDLE RACCOON R.
SOUTH RACCOON R.
DES MOINES RIVER
MIDDLE R.
SOUTH R.
SHELL ROCK R.
WAPSIPINICON R.
TURKEY R.
UPPER IOWA R.
WINNESHEIK
CLEAR LAKE
STORM LAKE
WALL LAKE
SPIRIT L.
L. OKOBOJI
DES MOINES
MUSCATINE
DUBUQUE
DAVENPORT
IOWA CITY
DES MOINES
BURLINGTON
KEOKUK
SIOUX CITY
COUNCIL BLUFFS
LOWER SILURIAN

MANUAL

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AND

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STATE OF IOWA.

BY CHARLES ALBERT WHITE,

PROFESSOR OF GEOLOGY IN THE STATE UNIVERSITY, LATE STATE GEOLOGIST, &C.

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PREFACE.

EVERY teacher knows how little any of our school books contain concerning the state in which we live, and that the little they do contain is often erroneous. The necessity for instructing our youth in relation to the physical character, resources, history, government, and institutions of the state, is too apparent to need comment. This little book is intended to meet that great want. I was induced to write it by the urgent request of some of my former pupils, who now occupy leading educational positions in Iowa, and also in compliance with a resolution of request by a convention of principals and superintendents of schools that met in Ottumwa, in January, 1873.

HINTS TO TEACHERS.

Every school room should have a good sectional map of the state hung where the scholars can see it constantly, and study it at proper times. It is necessary to have such a map in connection with the study of this book, because the one accompanying it is too small for the purpose. Such a map is especially necessary in studying chapters II., III., and IV., of Part First.

Before commencing the study of the book, the class should be instructed by the teacher in at least the outlines of the geography of the state. Each pupil should become familiar with the name and position of each of the rivers, the names of the principal cities, and their location, and many other matters that the teacher will readily see the necessity for. Indeed, the book is so written as to presuppose some knowledge of this kind on the part of the pupil.

Especial care has been taken to avoid error, but probably without entire success. It is very certain, too, that changes will be made from time to time in the laws and regulations explained and referred to, especially in Part Second. The teacher should be watchful in this respect, and be able to make any correction that may become necessary.

The questions accompanying the text are intended merely to aid the teacher in preparing the daily lessons. They embrace only a small part of the questions that will naturally arise during the recitations.

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PART I.

PHYSICAL GEOGRAPHY.

CHAPTER I.

INTRODUCTION.

1. **The Necessity for Comparative Study.**—In commencing the study of any region of country, we may always get a better knowledge of the subject if we consider it in relation to surrounding regions, and by comparing it with other states or countries. This is especially true of Iowa, because the physical features of the state have a greater degree of uniformity in its various parts than those of the earth's surface will average. For example: Some of the states and territories have mountain ranges running through them, but Iowa is a comparatively level state, with no mountain ranges within, or near, its borders. Others border upon one of the oceans, or the Gulf of Mexico, but Iowa is an inland state, many hundred miles from any sea-coast. Some have great lakes (really, fresh-water seas) upon their borders. Iowa is near no such lakes. In some states forests impeded their settlement and the cultivation of the soil. Iowa is a prairie state.

2. **The General Features of North America.**—If we start from the mouth of the Mississippi, and follow it northward to its source, the highest surface we shall pass over is not much more than seventeen hundred feet above the level of the sea. We shall find the greatest elevation in the

broad, open country, not far from the northern boundary of the United States.

Now, looking at a map of North America, we see that some of the tributaries of the Mississippi river reach out to the Allegheny range of mountains on the one hand, and to the Rocky Mountins on the other. Some of these streams, on either hand, being navigable nearly to the foot of the mountain ranges, the general slope of the country over which they flow is necessarily very slight.

3. **The Great Central Plain.**—These facts show us that the central portion of North America is a great, comparatively level, land, having the Mississippi and Missouri rivers as the great drainage channels of its southern portion. The elevation of the whole of this interior plain is not very great. It is enclosed, as it were, by mountain ranges along both its eastern and western borders, but it is without such elevated borders either to the northward or southward.

4. **Position of Iowa on the Continent.**—Iowa occupies a central position on this great interior plain, being about equally distant from the two great oceans, and also about mid-way between the northern and southern borders of the continent.

CHAPTER II.

BOUNDARIES AND SURVEYS.

Section 1. *Boundaries and Area.*

5. **Boundaries.**—The state has for its eastern and western boundaries, southerly flowing rivers; the Mississippi on the east, and the Missouri, together with its tributary, the Big Sioux, on the west. Its northern boundary is upon the north parallel of 43 degrees and 30 minutes, and the southern boundary is nearly upon the parallel of 40 degrees and 36 minutes. These boundaries give the state a four-sided outline resembling a square.

6. **Area.**—The distance from the northern to the southern boundary, excluding the small prominent angle at the southeast corner of the state, is about two hundred miles; and the greatest width of the state from east to west, is upward of three hundred miles. Owing to the irregular course of the river boundaries, however, the number of square miles the state contains does not amount to the multiple of those numbers. It has about 55,045 square miles. An official report to the United States Senate gives the number of *acres* of land in Iowa as 35,288,200.

7. **Artificial Boundaries.**—At least a part of the boundaries of all countries are *natural* boundaries,—that is, such as

are produced by sea-coasts, rivers, mountain ranges, etc.; but every civilized country is divided up into portions of various sizes and shapes by *artificial* boundaries. These consist of lines surveyed from point to point, previously agreed upon or determined. Thus, cities, towns, counties, districts, and sometimes even states, are artificially bounded and divided, with little or no regard to the natural features of the country.

Section 2. Land Surveys.

8. **Irregular Land Surveys.**—Original surveys consist in establishing artificial division and boundary lines, and determining the position of natural ones. These artificial lines are sometimes quite irregular, as for example, in the towns and counties of the New England and other states. The boundaries of these are irregular, and often crooked. Those that are straight seldom correspond with any of the cardinal points of the compass. This irregularity resulted from the want of a *public system* of land surveys when the country was first settled. The boundaries of estates were fixed by private citizens, and those of towns by local or personal influences. These necessarily became publicly legalized, and have consequently remained unchanged.

9. **The Rectangular System of Land Surveys.**—A glance at the maps of Iowa and other interior states will show that the counties have generally a rectangular outline, the boundaries having a north-and-south and east-and-west direction. It will be seen, also, that the counties are divided into squares of regular size, unless modified by the rivers. The large maps show, also, that the whole land is divided into still smaller squares.

This regularity in the division of the land is the result of an admirable system of surveys adopted by the United States Government in time to apply to our own, and other interior states, before they were settled.

10. **Every Person Should Understand this System.**—Therefore, an explanation of it is given in the next section. Some of the minor details of less general importance are omitted. Beside the relation of this system to the geography of the state, all deeds and leases of land, tax receipts, and many of our laws, are written with direct reference to it.

Section 3. United States Land Surveys.

11. **Original Ownership of the Land.**—In the thirteen original states the *state* government of each owned the public lands, but in a majority of the states and territories the *United States* government was the first owner as regards its own citizens. This was the case with all the land in Iowa, and all deeds and transfers of it are traced back to this source and no further. Before the land could be disposed of to the citizens it was necessary to divide it into small parcels, and the system here described was devised for that purpose. The civil division of the state into towns, counties, etc., although based upon the land surveys, was a subsequent

and separate matter, and will be described in Part Second.

12. **Points.**—This system of Public Land Surveys provides for the division of the whole country into small, square portions, of uniform size, varying from that shape only when the larger rivers, lakes, or sea borders make it necessary. To begin such a division of the land, there must of course be fixed points and lines to measure from. The points may be established anywhere, but usually some natural landmark is selected for them, and a record made of its latitude and longitude.

13. **Primary Lines.**—The primary lines starting from such points are of two kinds, namely: those running due north and south, and those running due east and west. The former are called "*Principal Meridians*," and the latter, "*Base Lines*."

14. **Principal Meridians.**—As errors of measurement are unavoidable in making extensive surveys, because it is inconvenient to continue surveys around great lakes and across large rivers with sufficient accuracy, and for other reasons, one principal meridian would not answer for the whole country. Therefore, new ones have been established as the surveys have been made farther and farther westward.

15. **The Fifth Principal Meridian** is the one from which all the north and south lines are measured. Its point of starting is at the mouth of the Arkansas river, in the state of Arkansas. It runs due north through Missouri and the eastern part of Iowa, and ends upon the bank of the Mississippi river at the boundary line between Clayton and Dubuque counties.

16. **The Base Line** from which all the east and west lines in Iowa are measured starts from the mouth of the St. Francis river, in Arkansas, and runs due west. It crosses the fifth principal meridian five miles west of the place of its own beginning, and forty-eight miles north of the place of beginning of the meridian. The point of intersection of these two primary lines is really the point from which all the Iowa land surveys are measured, as well as those of Arkansas and Missouri.

17. **Division into Townships.**—Commencing with the base line and the fifth principal meridian, the whole country adjacent, and in a western, and northern direction especially, extending hundreds of miles, is divided into squares six miles across. These squares are called townships, and are designated by *numbers*, and not by names such as are given to the civil townships. They are often, however, called "congressional townships," because they were authorized by a law of congress. This name is also used to distinguish them from civil townships, which are established by the people of each county (see Part II., paragraph 63).

18. **The Township Numbers** begin with No. 1 on each side of the base line, and count from that line both north and south. For example, every township in

the first tier north (or south either) of the base line, however far westward or eastward the tier may extend, is township No. 1. If we speak of any of these townships west of our principal meridian, we say it is township No. 1 west of the fifth principal meridian.

19. **Township Numbers in Iowa.**—Since the township numbers begin so far south, No. 65 is reached when we get so far north as the city of Keokuk, and the number of the northern tier of townships in Iowa is 100. The latter fact shows that the northern boundary of Iowa is about six hundred miles north of the base line from which our townships are numbered. Every township, then, in any one of the many long tiers that extend across the state from east to west has the same number in each tier. For example, Dubuque and Sioux City are both in township 89, although they are nearly three hundred miles apart. Des Moines and Davenport are both in township 78, although the two cities are more than one hundred and fifty miles apart.

20. **Ranges.**—This giving of the same number to many townships may at first seem like an imperfection in the system, but it is not, for, commencing on each side of the principal meridian with No. 1, the townships are again numbered, but this time, eastward and westward. This second series of numbers are the numbers —not, properly speaking, of townships, but of *ranges* of townships. So, if we give the number of the range in addition to the proper township number of any particular congressional township it cannot be mistaken for any other.

21. **Examples in Iowa.**—For example, Dubuque, as before stated, is in *township* 89, but it is in *range* 2 *east* of the fifth principal meridian, while Sioux City, also in township 89, is in range 47 *west* of that meridian.

22. **Use of these numbers as Guides to Localities.**—After one becomes familiar with this system of surveys he may calculate nearly the exact position of any township in the state as soon as he hears their proper numbers spoken. For example, Storm Lake is in township 90 north of the base line, and in range 37 west of the fifth principal meridian. That township is therefore ten townships, or about sixty miles south of the northern state boundary. It is also thirty-six ranges, or about two hundred and sixteen miles west of the fifth principal meridian, which, in that tier of townships, is not far from the Mississippi river.

23. **Correction Lines.**—Since meridian lines converge toward the pole, it follows that range lines, being all meridians, and starting six miles apart on the base line in Arkansas, would come nearer and nearer together the farther they were continued northward, if they were allowed to pursue an uninterrupted course.

The spaces, then, enclosed between the township and range lines, are not, after all, *precisely* square, but are a little nar-

rower at the north, than they are at the south, side. This is illustrated by Figure

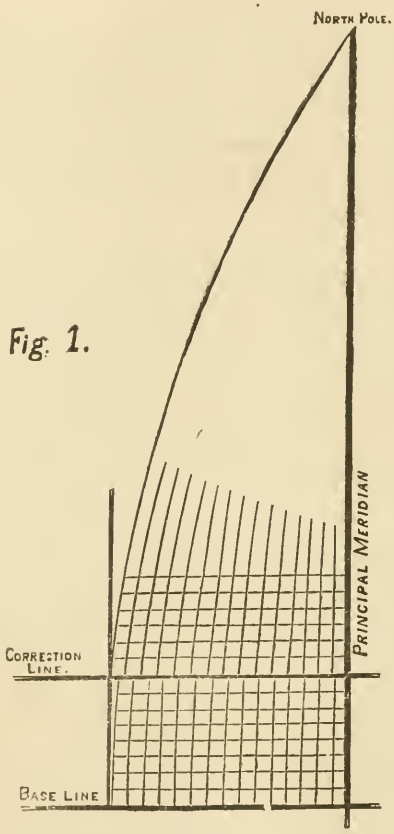


Fig. 1.

1. To remedy this, and to keep the townships as accurately as possible, of uniform and regular size, certain of the township lines are made correction lines. These correction lines serve in part for the correction of such errors as may have been made in bringing the surveys so far north from the base line. They also serve the purpose, in part, of new base lines, for upon them the range lines are placed just six miles apart again. This corrects the convergence the range lines had suffered in extending northward toward the pole. See Fig. 1.

24. **Correction Lines in Iowa.**— There are two correction lines running entirely across the state from east to west; one constituting the northern border of the 78th tier of townships, and the other, the northern border of the 88th tier. There are two or three others in the state, but they are short, and of less importance, having been established to correct irregularities in surveying. The northern and southern boundaries of the state are also, either wholly, or in part, correction lines.

25. **Section Lines.**—Each township is divided by both east and west and north and south lines into thirty-six equal parts, called sections; and the lines are called section lines. Each section is, of course, one mile square, and contains six hundred and forty acres. Sections are divided into quarters by "half-section lines." Quarter-sections may be, and often are, divided in a similar manner into four equal parts, called quarters of quarter-sections.

26. **Numbering Sections and Designating their Parts.**—The sections of each township are numbered from one to thirty-six, beginning in the northeast corner of the township, and counting in the order shown in Figure 2. This order in placing the numbers is never departed from, and one soon learns to tell his position in a township by learning the number of the

Fig. 2.

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Diagram of a Township.

section he is upon. Sections are divided into quarters, by half-section lines (a, b, and c, d, Fig. 3). The quarters of a section are designated as the northeast, the northwest, the southwest, and the southeast quarters, as shown in Figure 3. The quarters of quarter-sections are designated in a similar manner, and Figure 3 will illustrate it if we call it the diagram of a *quarter-section*, instead of a *section*. For example: Supposing Section 10 were to be divided into quarters, and its northeast quarter were also divided into quarters; these last-named quarters would be called the northeast, the northwest, the southwest, and the southeast, quarters of the northwest quarter of section 10.*

Fig. 3.

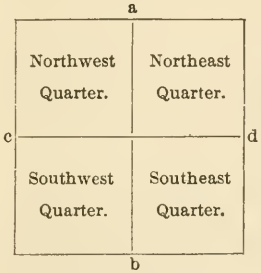


Diagram of a Section

27. **Description of Land.**—By means of this excellent system of land surveys, a clear and accurate description may be given of any farm or piece of land in very few words. For example: If a deed for the forty acres in the extreme southwest corner of Cedar county were to be written, the description would read thus: "The southwest quarter of the southwest quarter of section thirty-one, in township seventy-nine north,* range four west of the fifth principal meridian."

Although the descriptions are so brief, they are sometimes made shorter by abbreviation. The foregoing description may be abbreviated thus: SW¼ of SW¼ of Sec. 31, Tp. 79, N., range 4 W of 5th P. M.

Since the full description is so short, and the danger of mistakes is increased by the use of abbreviations, the latter should not be used in writings of great importance.

28. **Maps.**—A "township map" is one which gives only the township and range lines of the survey. A "sectional map" is one which gives the section lines also, in addition to the township and range lines. Maps drawn on a larger scale, such as some county maps, give, in addition to the other lines, half and quarter section lines also, and sometimes even the other boundaries of farms, etc. On sectional and township maps the range numbers are usually placed just above the northern, and just below the southern, boundary of the state. The township numbers are placed along the principal meridian, or along some other north and south line in the body of the map.

*Note to the Teacher.—Let the pupils be exercised as to the number of acres in each division or part of a section, the order of the section numbers in a township, and the position of any given section in relation to each border of the township.

*That is, north of the base line, which, as already explained, is in Arkansas.

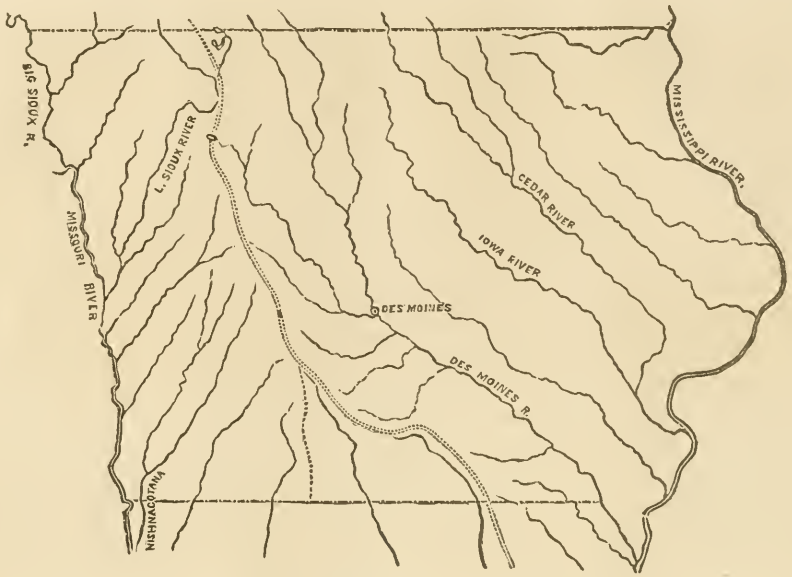


Fig. 4.

29. **The General Level.**—It has already been shown that Iowa is in the midst of a broad, comparatively level land. Consequently the state cannot have a very great diversity of surface. Those who live near the larger rivers may think this is a mistake because they see bluffs and valleys all around them. But it is the average of the whole state that is meant when it is said to be comparatively level. One has generally to go only a short distance from the bluffs that border the river valleys and look out over the country, for it is mostly prairie away from the valleys, to see that, although the surface is somewhat uneven, it presents the appearance of a general indistinct level as far as the eye can reach. From this general level no high hills arise, and below it there are no deep depressions except the river valleys.

30. **Valleys worn out of the General Level.**—Geologists believe that the valleys of Iowa have been worn down from the general level by the same streams that now flow in them. In some places the valleys have been worn out of the earthy material alone, but in others the rocky ledges also have been worn through.

31. **Valley-Sides and Hills.**—There are, then, not only no mountains in Iowa, but there are very few hills either, properly speaking. It is true that the steep sides of valleys are often spoken of as hills and hillsides, but they are more properly called valley-sides, because they are *below* the general level of the surrounding

country. A hill is, properly, an elevation of land *above* the level of the surrounding country.

32. Drainage Slopes.—It must not be understood that this so-called general level of surface of the state is an *actual* level. If it were so the waters would not drain off and the streams would not flow. Figure 4 shows how the streams of the eastern part of Iowa flow southeastward into the Mississippi, and that those of the western part flow southwestward into the Missouri.

Both the great rivers also flow southward. These facts show that there are not only an eastern and a western drainage slope, but also that the whole state slopes to the southward. The eastern, is often called the Mississippi slope, and the western, the Missouri slope.

33. Water-Sheds.—The elevation or line which divides the Missouri and Mississippi drainage slopes is often called "the great divide," and sometimes, "the dividing ridge." A more proper name for it is 'great water-shed.' It is called the *great* water-shed because it sheds the draininge each way into the two great rivers, and also to distinguish it from secondary water-sheds between the smaller rivers. The latter also are commonly called divides. None of the water-sheds in Iowa are really ridges. On the contrary, they are usually the flattest portions of the state. They have retained their original flatness of surface because no valleys have been worn out of it there.

34. The Great Water-Shed in Iowa.—If one should start at the northern state boundary to follow the great water-shed, he would cross, either wholly or in part, the following counties: Dickinson. Clay, Buena Vista, Sac, Carroll, Audabon, Guthrie, and Adair. So far southward it constitutes the highest land along any east and west line that may be drawn across the state. In Adair county the great water-

shed bends away to the southeastward and passes across greater or smaller portions of Madison, Union, Clarke, Lucas, and Appanoose counties, when it passes into Missouri. Along this latter part of its course the great water-shed is not the highest land between the two great rivers, but that highest land southward from an east-and-west line through Adair county is the secondary watershed between Grand and Platte rivers. This water-shed passes from Adair, through Union and Ringgold counties to Missouri. The position of this high secondary water-shed is shown in the diagram Figure 4 by the single dotted line, while the double dotted line, extending from the northern to the southern state boundary, shows the position of the great water-shed.

35. **Elevation of Iowa above the Level of the Sea.**—The height of the surface above the level of the sea, at many places in the state, has been ascertained by means of the barometer, and by railroad levelings from those, and other places. From these measurements the *average* height of the whole surface of the state has been estimated at between eight hundred and nine hundred feet. This seems to be a very slight elevation when we remember that Iowa is nearly in the center of the continent.

36. **Elevation of Principal Points above the Sea.**—The surface of the Mississippi at low water, at the southeast corner of the state, 444 feet.

The surface of the Mississippi at low water, at the northeast corner of the state, 660 feet.

The surface of the Big Sioux at low water, at the northwest corner of the state, *about* 1,344 feet.

The surface of the Missouri at low water, at the southwest corner of the state, 954 feet.

The surface of the great water-shed at the northern state-boundary, near Spirit lake in Dickinson county, *about* 1,694 feet.

The surface of the highest ground between the Mississippi and Missouri, at the southern state-boundary, in Ringgold county, *about* 1,220 feet.

37. **Slope per Mile.**—Now, by ascertaining the distance from one to another of all these points, the rate of slope of the general surface is shown to be as follows: From the great water-shed, along the northern state-boundary to the northeast corner of the state, 5 feet 5 inches per mile.

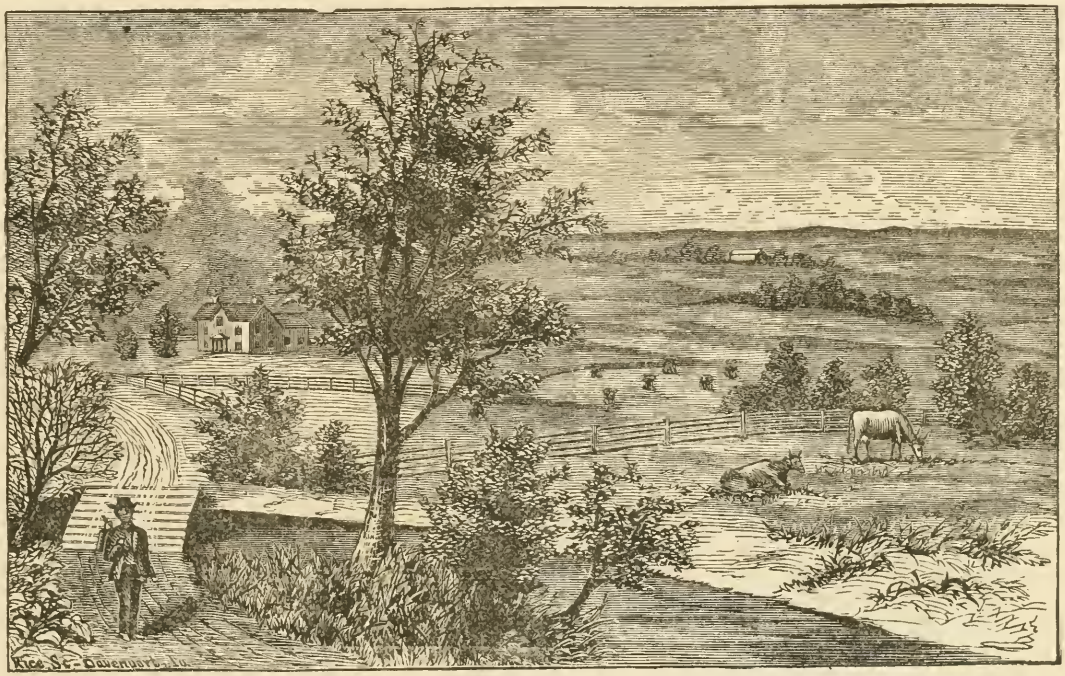
From the same starting point to the northwest corner of the state, 5 feet per mile.

From the highest land between the two great rivers, along the southern state-boundary to the southeast corner of the state, 5 feet 7 inches per mile.

From the same starting point to the southwest corner of the state, 4 feet 1 inch per mile.

From the northeastern to the southeastern corner of the state, in a straight line, 1 foot 1 inch per mile.

From the northwestern to the southwestern corner of the state, in a straight line, 2 feet per mile.

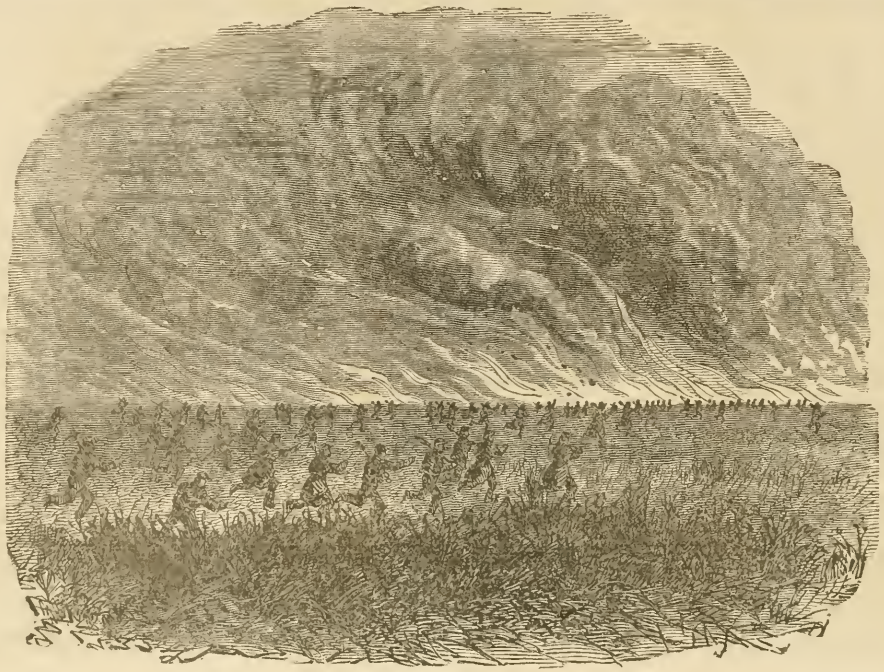


From the highest point in the state (near Spirit lake), to the lowest point (at the mouth of the Des Moines river), 4 feet per mile.

38. **Illustration.**—It is difficult to form a correct idea of these slopes when given in feet and miles, but if the scale is reduced to feet and inches we find that the steepest slope mentioned in the last paragraph amounts to only about one-seventh of an inch in ten feet. The *average* surface of our state, then, is really as level as floors usually are. All the diversity which we see about the valleys and ravines, and upon the rolling prairies, are only wrinkles, as it were, in this general level surface. Although the term wrinkles is used, we must not forget that there is really much diversity of surface, even upon the prairies, and that many of the valleys are large and very beautiful.

Section 2. The Prairies.

39. **Description.**—Prairies are more or less extensive tracts of land without trees, and covered with grasses intermingled with many bright-flowered plants. They may be so level as to look much like the quiet surface of the sea, or they may be what are called rolling prairies. The latter are so called because of the peculiar appearance of the surface. While the river valleys were being deepened by the steady flow of water for thousands of



years, the drainage of the surface water into the upper branches of the rivers during that time gradually made broad smooth hollows in the surface and left smoothly rounded ridges between them. This has caused the surface of such prairies to look much like that of the sea when it is covered with large rolling waves. This likeness to the sea is much increased when, in summer, a real wavy motion is produced by the wind upon the grass. A seeming motion is also often caused by the shifting shadows of swiftly moving clouds over the rounded ridges.

40. **The Prairies of Iowa** are almost all rolling. A few are somewhat flat, such as some of those in Des Moines, Henry, and Wayne counties, and some also upon the great water-shed. The valley bottoms and sides, especially those of the larger streams, are usually covered with forest trees, but even these are sometimes prairie surfaces. Almost without exception the broad high lands between the valleys are now or formerly were prairies. They often extend from these high lands without interruption to the water's edge of the smaller rivers and creeks, but usually in such valleys there is a continuous border, or occasional clumps, of trees standing near the water.

41. **Origin of the Prairies.** — The question is often asked, "How came trees to be absent from the prairies?" Yet

this absence from the prairies is no more wonderful than their presence upon forest ground is. However all this may be, it is very certain that the prairies *remain* such in consequence of the annual fires. This is known to be so because forest trees naturally and quickly encroach upon all praries when fires are prevented, and because all kinds of trees that grow naturally in the state will thrive well when transplanted upon prairie soil.

42. **Prairie Fires.**—Almost every autumn or winter the dry grass of the larger prairies is burned off by fires lighted by accident or otherwise. But the roots are not injured and the grass starts fresh and vigorously in the spring. The fires are dangerous to fences, buildings, and crops upon the neighboring farms. Many persons have also lost their lives by being caught in the flames, which move rapidly and are very destructive when the wind is high. The fires may usually be controlled with little trouble if the air is still.

43. **The Prairies are Disappearing.**—It is estimated that, when the state began to be settled, at least nine-tenths of the surface was occupied by prairies. Ever since then they have been rapidly growing smaller and disappearing. This is caused largely by the cultivation of the land, but also by the encroachment of the forest trees upon them by natural growth. When the latter change takes place the prairies become like any other wood-land;

and if by the former, they become like any ordinary cultivated country. Large prairies are yet to be seen in many of the counties, but it is in the northwestern part of Iowa where they have become least changed, because it is that part that is at present least occupied by farms and villages.

CHAPTER IV.

RIVERS.

44. **Names of Rivers.** — The Indian names of many of the rivers in Iowa have been retained, and written more or less nearly as they were pronounced by them; or else their meaning has been translated into English. But some of the rivers were named by the early settlers. It was their habit to retain the name of the main stream for all its branches. These they called "forks," and added the word, "east," "west," "north," "south," or "middle," as the case required. Thus we have the East, West, and Middle Nodaway rivers, the North, South, and Middle Raccoon rivers, etc. It would have been better if separate names had been applied to all the branches, but it is very difficult to change the name of any natural object after the people have once made general use of it.

45. **The Water** of all the rivers of Iowa is usually clear, except that of the Missouri. That river is one of the muddiest streams on the globe. It contains more sediment when the water is high than when it is low, but it is always so muddy that no object can be seen in it be-

neath its surface. The sediment gives the water a dirty-yellow color, something like that of the puddles which we see in the road after a rain. The water of the other rivers is generally made quickly muddy by heavy rains, because the channels of the greater part of the upper branches are muddy, and not gravelly or rocky.

46. **The Valleys** have nearly flat flood-plaines, from two to ten times as wide as the stream is between its banks. These flood-plains are commonly called "bottoms" in Iowa, and are usually covered with forest trees. A part of the bottom land is covered by freshets every year. A little more of it is covered by extraordinary floods, but some parts of the bottoms of all the valleys are not now reached, even by the highest floods, because the rivers have worn their channels deeper since such parts were formed.

47. **The Bluffs.**—Sometimes the valley sides slope gently away from the bottoms to the high lands, but the valleys are often bordered by steep sides, called bluffs. From the top of these usually begins the general level of surface between all the rivers. The bluffs differ in height and character in different parts of the state and along different valleys.

48. **The Mississippi Bluffs** are almost continuous from the northern to the southern state boundary. Their sides are often steep and rocky. They vary in height from one hundred and fifty feet to more than four hundred feet above the level of the river, the highest being near the northeast corner of the state. Standing upon the top of these bluffs, a person may often see, at one view, the river, the bottom, the opposite bluffs, and sometimes a large space of the high land beyond. At a few places the bluffs are near the river upon both sides. This is the case along both the upper and lower rapids, at Dubuque, etc., but ususally the bluffs are from four to eight miles apart below Dubuque, and from two to three

miles apart above that city. Below Dubuque, the bluffs are not usually so steep and rocky as they are above; nor are they so high.

49. **The Mississippi Bottom.**—As one stands upon any of the bluffs of that part of the river above Dubuque, looking up and down, the valley appears like an immense, crooked canal, nearly emptied of its water, and with trees growing upon a part of its bottom. The bottom along this part of the valley is much divided into islands by what are called sloughs. These are really separate channels in which parts of the river run for short distances and then join each other, or the main stream, again. Below Dubuque, islands are also formed in the same manner, but not so many. The river in this parts of its course runs from side to side of the broad bottom, coming near the bluffs first upon one side and then upon the other. This leaves many broad portions of the bottom, stretching, in some places, five or six miles out from the base of the bluffs. The Mississippi bottom is usually covered with forest trees, but in some places it is prairie.

50. **Slope of the Mississippi.**—The slope of one foot and one inch per mile, given in paragraph 37, is for a *straight line* from the northeast to the southeast corner of the state, but the slope of the *river* between those two points is only half as much, or only an average of about six inches per mile. This is because the great bends of the river shown on the map, together with the very numerous short bends which the map does not show, make the distance by the channel of the river about twice as great as it is in a straight line.

51. **Rapids of the Mississippi.**—At two different places in the Mississippi the slope is much greater than the average, as given in the last paragraph. This makes the current so much swifter at those places, that they are called rapids. The current is not too swift to allow steamboats to pass up over them, but there are many rocks under the water which make it more dangerous for steamboats there than it is in other parts of the river, if they do not carefully keep the channel. When the water in the river is very low, it is sometimes so shallow upon the rapids that steamboats cannot pass over them, even when they can sail with ease in other parts of the river.

52. **The Lower Rapids** occupy that part of the river which lies between Keokuk and Montrose. They are sometimes called the Des Moines rapids, probably because they are so near the mouth of the Des Moines river. Their length is about twelve miles, and the slope in the whole distance is about twenty-five feet. A canal is now being made along the Iowa shore of the rapids, in which steamboats may pass by them in safety at any stage of water.

53. **The Upper Rapids** are sometimes called the Rock Island rapids, because that island lies in the river at their

lower end, where it divides the rapid current. These rapids are about fifteen miles long, and extend from Davenport to Le Claire. The slope for the whole length is about twenty-six feet.

54. **The Bluffs of the Missouri,** along the border of Iowa, are very different from those of the Mississippi. They have no rocky sides, and, indeed, they contain no rocks at all except at a few places, where they are found near their base. The bluffs are composed throughout of a fine, earthy substance, the surface of which forms the soil. They do not present steep, continuous faces to the valley, such as are often seen in the Mississippi bluffs. They are broken up into numerous smoothly-rounded summits, so that they look like a multitude of small hills resting upon the high border of the valley. Their average height between the mouth of Big Sioux river and the southern state boundary is from two hundred to nearly three hundred feet above the river. Their sides are so steep, it is often difficult to climb them. The ravines among the bluffs usually contain some forest trees. These are gradually encroaching upon the bare sides, but the greater part of their surface is yet covered only with grass

55. **The Missouri Bottom** varies in width from five to twelve miles between the bluffs on either side. In most respects it is much like the Mississippi bottom, but it has not so large a part of its surface covered with trees. The greater part of the bottom is prairie, especially those portions at a distance from the river. The prairie portion is annually covered with a very rank growth of grass and other plants. A large part of the Missouri bottom is never reached by the highest floods of the river, and is regarded as a very valuable region on account of its remarkable fertility. It contains villages, railroads, and many very extensive farms.

56. **The Slope of the Missouri,** along the border of Iowa, is one foot per mile, and it is therefore a much swifter stream than the Mississippi. This is, of course, the slope of the channel in all its windings.

57. **The Smaller Rivers.**—The description of these rivers and their valleys is necessarily brief, and is intended only to give the pupil a general idea of their character. Some of them are grouped together for description, because they are so much like each other. Indeed, all the rivers of Iowa are much more like each other than they would be in a less level country. Although the scenery of Iowa valleys is less striking and more uniform than that of some others, the valleys of these rivers are often very beautiful.

58. **The Valleys of the Eastern Drainage Slope** have rocks exposed in their valley sides at more or less frequent intervals, but, except a few boulders, rocks are seldom seen in any of the small upper branches. The valley sides often slope gently to the high lands, but all the

valleys have rocky bluffs, of greater or less height, in some part of their course. Those rivers especially, which empty into the Mississippi in the northeastern part of the state, have high, rocky bluffs, on both sides of their valleys. Their scenery is, consequently, much bolder than that of the other valleys.

59. **The Upper Iowa River.**—It is unfortunate that this name should have been retained for our most northeasterly river, because a still larger one in the state is called the Iowa river. The name is not even appropriate, according to the habit the early setters had of applying the words, upper, lower, etc., to different branches of the same stream, because these two Iowa streams have no connection with each other. The Upper Iowa empties into the Mississipi near the northern state boundary. Its valley is cut deeply out of rocky strata nearly its whole length, and it differs from most of the other valleys of the eastern drainage slope in having a narrower bottom and higher bluffs. This is said to be the only river of Iowa in the branches of which trout are found.

60. **Turkey River** is much like the Iowa, as regards both its stream and valley. Its bluffs, which are usually rocky, do not average quite so high, and its bottom is somewhat wider.

61. **The Maquoketa and Wapsepinicon Rivers** are much like each other. Their valleys are a little broader and not so deep as that of Turkey river. Their bluffs are usually rather low, but frequently rocky, especially along the principal portions.

62. **The Iowa and Cedar Rivers.**—The stream and valley of the principal part of Cedar river are much like those of the Maquoketa and Wapsepinicon, but that branch of it called the Shellrock is more rocky than is usual with the branches of the other rivers of the state. The Iowa has many rather low, rocky bluffs, in different parts of its course, but a large part of its valley has gently sloping sides, and broad bottom lands.

63. **Skunk River.**—The Indian name of Skunk river was Checauqua, and ought not to have been translated. There are occasional rocky bluffs in the valley sides of the lower part of its course, but a large part of its valley has the sides sloping gradually away from a broad bottom to the high lands. A large part of the bottom is overflowed by high water, which made travel across it very difficult, at times, before good roads and bridges were constructed.

64. **The Des Moines River** rises in southwestern Minnesota, and flows entirely through Iowa, in a southeasterly direction. Except a few boulders, no rocks are seen in its valley as far down as Humboldt county. The valley has very little flat bottom land in that part of its course, and its sides slope away gently and blend with the high land. Southward from Humboldt county, the valley

grows broader. Its bottom is more distinct from the sloping valley sides, and exposures of rocky ledges are sometimes seen. Southward from Wapello county, the bluffs begin to be more distinct, and frequently rocky.

65. **Valleys of the Western Drainage Slope.**— These valleys have, as a rule, far less rock exposed in them, and contain fewer forest trees. In some of them no rocks, except a few boulders, are to be seen, and rocky bluffs are rare in any.

66. **Chariton, Grand, and Nodaway Rivers.**—The streams known by these names in Iowa are only branches of rivers in Missouri, which bear those names. They empty into the Missouri in that state. Their valleys in Iowa, especially the first two, are much like those of the southeastern part of the state. They have occasional exposures of rock in the sides of their principal portions, and their bottoms there have a greater or less growth of forest trees upon them. Grand river valley contains a greater amount, both of rock and forest trees, than any other valley of the Missouri drainage slope. Chariton valley has, however, about an equal amount of woodland.

67. **The Nishnabotany Rivers** have smooth, beautiful valleys, the prairies often extending down to the water, and their valley sides gently sloping away to the high lands. Their bottoms are often broad, and because they have a very gentle slope towards the stream, they are usually as dry as ordinary prairie. Rock is found exposed in their valleys at only a few places, and forest trees are not plentiful there.

68. **The Little Sioux,** and other rivers to the southward, together with the Floyd, to the northward, have, almost without exception, no exposures of rock in their valleys, except a few scattered boulders. These are usually more numerous in the upper part of the courses of the valleys, because in the lower part the drift, which contains the boulders, is covered by another deposit. Some forest trees are found near the streams, but woodland is not extensive anywhere in this part of the state. These streams run through a rolling prairie region. Their valley sides are never rocky, and seldom steep, but are usually undulating, and more or less gently sloping. The bottoms are seldom flat, like the bottoms of the other valleys described, and are, consequently, excellent, tillable land.

69. **The Big Sioux** rises in Dakota. Downward, from the place where it reaches the northwest corner of the state, it forms the western state boundary until it empties into the Missouri. Upon the Iowa side, the valley is bordered along most of the distance with rather high, rounded bluffs. These are often quite steep, and for several miles from the mouth of the river they resemble the Missouri bluffs. A few miles up the stream, from the northwest corner of Iowa, the Big Sioux, by a series of cas-

cades, over ledges of hard red rock, falls from a height of sixty feet, within the distance of half a mile. There are no falls in that portion of the river which aqjoins Iowa. Its slope is much like that of the other rivers of Iowa, except the eight or ten miles nearest its mouth, where the current is sluggish. No rocks, except a few boulders, are found in the valley or bluffs, along much the greater part of its course upon the borders of the state. The bottom, in the greater part of this distance, is much like that of the upper part of the Des Moines, but at its southern end it is flat and very broad. There are comparatively few trees in the valley, and the whole course of the river is through a great prairie region.

CHAPTER V.

LAKES AND PEAT MARSHES.

70. **Bottom Lakes.**— These are so called because they are found upon the river bottoms, and also to distinguish them from the upland lakes. They once formed parts of the channels of the rivers near which they are found, and have been cut off by the shifting of those channels. All of our rivers are gradually shifting their channels in some places, by the wearing of the current. Sometimes a new channel is cut through a part of the bottom, and the part of the channel thus left becomes a lake by having its ends stopped up with the drifting sand and mud brought by the current. Such lakes may exist upon the bottom of any valley, but they are larger and more numerous upon the Missouri bottom than any others in Iowa. A few of these are now above the reach of the river floods, but usually the highest floods reach them. Some of the former in the valleys of the smaller rivers have become filled with peat. Even the largest of these lakes are nameless and of little importance. Some of them are represented upon the larger maps of the state.

71. **The Upland Lakes** are found on or near the water-sheds of the northern part of the state. None are found in the southern part. Many of them are very beautiful. They have clear water, gravelly beaches and dry, grassy slopes to their shores, but they are mostly small, and in some parts of the country, the largest of them would be called ponds. The four following are the largest and best known:

72. **Spirit Lake** is noted as the place of a terrible massacre of white people by the Indians, in 1857. It lies upon the great water-shed in Dickinson county,

with its northern shore upon the northern boundary of the state. Its surface contains between ten and twelve square miles, its greatest width and greatest length being each about four miles. Its beach is gravelly and it has woodland along a great part of its shore, but the prairie adjoins part of it.

73. **Okoboji Lake** lies directly south of Spirit lake and is also in Dickinson county. It has somewhat the shape of a horse-shoe, with the open side to the north and the eastern prong coming up to within a few rods of Spirit lake. At this place the latter lake drains into Okoboji by a small outlet, and Okoboji, in turn, into Little Sioux river. If one should follow the outer shore of Okoboji lake from the point of one prong to that of the other, the distance traveled would be about fifteen miles. The beaches of this lake also are mostly sandy or gravelly, and the land around it is partly wooded and partly prairie. The region around both Spirit and Okoboji lakes is very pleasant and beautiful. Fish are plentiful in the water, and in spring and autumn wild water-fowl are abundant.

74. **Clear Lake** lies upon the water-shed between Iowa and Cedar rivers, in the western part of Cerro Gordo county. Its greatest length is about four miles, which is eastward and westward. Its greatest width is about two miles. Its beach is gravelly and its shores mostly wooded. Its outlet, which is ocasionally dry, is into a branch of Shellrock river.

75. **Storm Lake** is situated upon the great water-shed in Buena Vista county. Its surface contains not far from five square miles. Its beach is clean and gravelly. The surface of the surrounding country is gently rolling prairies. The trees, which the inhabitants have planted abundantly, will make the region much more beautiful, when they are grown.

76. **Walled Lakes.**—There is a small lake in Wright county, and another in Sac county, which have become somewhat generally known as "walled lakes." It has been supposed that the so-called walls upon their shores were the work of human hands, and that the Indians or some unknown ancient people made them. The truth is, they are not walls, and were not made by hands, but were made by the ice. If a kettle is filled with water and it allowed to freeze solid, the kettle is burst asunder by the expansion of ice in the act of freezing. Those ponds or lakes are shallow, especially at the beginning of winter. The water freezes to the bottom along the shore, and also some distance out from the shore, as the ice thickens. As the whole surface of the pond is frozen, the expansion of the ice is in all directions from the centre toward the shore. Of course, as the ice moves out, it carries with it whatever it is frozen to upon the bottom. One winter's freezing will move the material but very little, yet the freezing having been repeated every winter for centuries, it has been moved a considerable distance. In this way great quantities of sand. gravel, and

boulders which were upon the bottom, within reach of the ice, were moved outward and collected in ridges just where the expansion of the ice stopped. These are the so-called walls. They sometimes consist of boulders, sometimes of sand and gravel, and sometimes of turf — anything, indeed, that may have been upon the bottom of the lake. It is not only the two lakes mentioned that have such ridges on their shores, but similar ridges are to be found on some part, at least, of the shore of almost every lake and pond in northern Iowa.

Section 2. *Peat.*

77. **How Peat is Formed.**—Peat is sometimes called turf, and is much used for fuel in different parts of the world. When it is wet it appears much like dark brown mud, but when dry it somewhat resembles rotten wood. It is formed from the remains of the yearly growth of certain kinds of plants, which become partially decomposed while kept constantly moist. As it is necessary that the dead plants should be kept *constantly* moist, only those kinds are changed to peat which grow in moist places. Peat is often formed partly of grass, but it does not form upon the prairies because the surface, of even the most moist places, is dry for at least a part of the year, and the grass becomes wholly rotted, if not burned. All the peat of cool, temperate climates is largely made up of a kind of moss, besides other plants. In northern Iowa a kind of grass, called wire-grass, grows with the moss, and the two together form almost the whole of the peat there.

78. **Spring Marshes.**—Peat may be formed in various positions, but in Iowa it has been produced either in ponds or springy places. Marshes of the latter kind are not common. They may occur in various positions, but they are sometimes formed upon the gentle slope of a valley side. In such cases, the spring water, oozing out of the ground towards the upper part of the valley side, spreads over considerable space. This supplies the necessary condition of constant moisture, for the growth of the peat-forming plants.

79. **Pond Marshes.**—When peat collects in ponds it usually begins at the edges, and, as the frost kills the vegetation every autumn, the border of peat which is produced from it grows broader and broader, until it meets in the center, and fills the pond. When thus filled, the surface of the peat-marsh is as level as the surface of the water was when the marsh was a pond. All but a very few of the peat-marshes of Iowa are pond-marshes. Much the greater number and most important of them are upland ponds, which occupy positions similar to those of the upland lakes, mentioned in paragraph 71. The marshes may be from a few rods to a mile in length and breadth. A few pond-marshes are found in river valleys, the ponds having had an origin

similar to that of the bottom lakes, mentioned in paragraph 70.

80. **Appearance and Character of the Pond-Marshes.** — Being perfectly level, the upland pond-marshes have the appearance of ponds of water resting in the depressions of the rolling surface, usually prairie. They still more resemble ponds when the wind blows over the thick growth of waving wire-grass that covers them. As one walks out upon the marsh, he finds a thick layer of moss at the roots of the grass. As he walks, he feels the marsh quivering beneath him, but there is little danger of breaking through into the soft peat, because grass-roots and moss make a strong, tough covering. The peat in these marshes varies from one to ten feet in depth.

81. **Parts of Iowa in which Peat is Found.**—Very little if any peat suitable for fuel has been found upon the western drainage slope. Very few marshes exist upon the eastern drainage slope south of the correction line which forms the northern limit of township 88. Those that do exist there are nearly all bottom-pond marshes, but some of them are now much above the level of the adjacent stream. Very much the greater part of the peat to be found in Iowa lies in that part of the state which is east of the great watershed, and north of the correction line before mentioned. It is most plentiful in Cerro Gordo, Hancock, Worth, and Winnebago counties.

82. **How Peat is Prepared and Used for Fuel.**—Peat may be used with very little preparation. The marsh must be drained by cutting a ditch. Then with a sharp spade, or a similar instrument, the peat is cut out in pieces of convenient size, and dried in the sun. It may be made more solid and convenient for use by grinding it while wet, into a soft pulp, and then moulding it while wet, as brick are moulded. While these moulded pieces are drying they become more solid, merely by shrinking, than they could be made by pressure, without grinding. The peat of some countries becomes quite solid when merely cut out and dried. That of Iowa is usually light, but the grinding causes it to become solid by drying.

CHAPTER VI.

GEOLOGY.

83. Definition.—Geology is the science which explains the structure and mineral composition of the earth, the causes of its physical features, and its history. The object of this book is to treat only of Iowa, but before the geology of the state can be explained it is necessary to briefly explain the science.

84. Structure of the Earth's Crust.—Rocks of some kind exist everywhere beneath the soil and waters that cover the surface of the globe. They are most exposed to view in the sides of valleys, tops of hills and mountains, and along portions of the coasts of seas and great lakes. Whether hard, like limestone, sandstone, and granite, or soft, like clay and sand, geologists call them all rocks. They usually lie in beds or layers in our region, as we may see in any of the quarries, when they are called *stratified rocks*. Down deep beneath all these stratified rocks we have reason to believe there are *crystalline rocks*, such as granite, etc., which are not stratified. Such crystalline rocks are also often found at the surface, especially in mountainous and hilly districts.

85. Stratified Rocks.—How crystalline rocks have been formed is not always clearly understood, but stratified rocks have been formed in water. They received their stratified character by settling as sediment upon the bottom, layer upon layer, which afterward hardened into rock. These layers are also called strata.

86. Fossils.—We shall find, upon examination, that most of the stratified rocks contain shells, corals, and other remains of animals, solidly imbedded in them, or loose between the layers. They are usually found to be much broken, but sometimes they are quite perfect. These remains are called fossils. Since they are similar to those of animals that now live only in the sea, and whose remains are also found imbedded in the mud of the sea bottom, we infer that the rocks in which we find the fossils formerly consisted of sediment upon the bottom of the sea. It is only the hard parts of animals, such as bones, shells, crusts, etc., that are preserved as fossils. All the soft parts soon rot and disappear when the animals die.

It is not only in rocks that have been formed in the sea that fossils are found; they are also found in the sediment which has been deposited in lakes and rivers, and occasionally, also, in peat-marshes. Sometimes portions of vegetation, as well as of animals, are found as fossils. These are often only leaves, or rather only the impressions of leaves, resembling such as may be made by pressing a leaf between two pieces of soft clay, and then separating them.

87. Stratified Rocks elevated above the Sea.—When stratified rocks were first deposited they were necessarily in a level, or nearly level, position. But they

are frequently found hundreds of miles from the sea, and often much tilted or inclined. Some are found in mountain ranges, folded and bent, thousands of feet above the level of the sea. They have, of course, been raised out of, and above the level of, the sea since they were formed. By this we know that what is often called "the solid ground" is really movable, and that a large part of it, if not the whole, has been more or less moved. We know, also, by these facts, that much the greater part of the earth's surface was once beneath the sea.

88. **Earth-History taught by the Rocks and their Elevation.**—All the continents were at first small, or their present place was occupied by a number of islands. They became such continents as we now find them by additions upon their borders as the land was raised. Bed after bed of rock material was deposited while the land was rising, and now we find those beds lapping upon each other with their edges pointing away from where was then the sea. The uppermost of these beds are, of course, the newest, or latest formed. These facts give us a kind of history, not only of the rocks themselves, but also of the growth of the continents in size.

89. **Earth-History taught by Fossils.**—When we come to collect and to study the fossils of the rocks thus formed and elevated, we find that they are similar to corresponding remains of animals now living, but yet they are all more or less different, and we find that the difference increases as we go from the newer rocks, or those latest formed, to the older or earlier formed rocks. We learn by such study of the fossils and the rocks together that a gradual change has taken place in the *life-history* of the earth, as well as in its *rock-history*. In other words, we find that kind after kind of animals and plants have been created and destroyed, in progressive order, as age after age passed by.

90. **Branches of Geology.**—This life-history and rock-history together, constitute *Historical Geology*. *Lithological Geology* treats of rocks; their kinds, structure, condition, etc. *Dynamical Geology* treats of the forces which operated in the processes of rock-making, the elevation of continents, islands, and mountain ranges, and the production of volcanoes and earthquakes. In short, it treats of all the changes and disturbances that have taken place in the rocky crust of the earth. *Physiographic Geology* treats of the surface-features of the earth, and their causes.

91. **Geological Time; How it is Studied.**—Writers of human history refer to such divisions of time as ages, eras, epochs, periods, etc. These terms are often used merely as means of convenient reference to certain series of past events, but, through them all, the years are numbered in regular succession as they passed, even down to the present year. On the contrary, when we come to study the past history of the earth, we have no means of

ascertaining the number of years that have passed during any portion of it. We study this history by means of the evidence which we see of changes that have taken place upon the earth, both in the rock material of which its crust is composed, and in the forms of living things that have existed upon it. We know by such means, that geological time has been immensely long—longer, we believe, than could be easily computed in years, even if they had left in the forming rocks an unbroken record of their passing.

92. **Divisions of Geological Time.**—Geologists use names for the divisions of geological time similar to those used by the historian. Thus we find Geological time divided into *ages*, ages into *periods*, and periods into *epochs*, all, of course, without reference to the years that were passing all the while. These ages, commencing with the oldest rocks in which traces of former life have been discovered are called: 1. *Lower Silurian.* 2. *Upper Silurian.* 3. *Devonian.* 4. *Carboniferous.* 5. *Mesozoic.* 6. *Tertiary.* 7. *Age of Man.* The rocks below the oldest of these are called Azoic.

93. **Distinguishing Characters of the Geological Ages.**—During each of these ages certain kinds of living things were the leading, or principal kinds. Various kinds of Mollusks (which include all shell-fish) were the leading kinds in the Lower and Upper Silurian ages; Fishes, of the Devonian age; abundant Vegetation, of the Carboniferous age (this furnished the material for coal); Great Reptiles, of the Mesozoic age; Mammals (the ordinary four-footed animals), of the Tertiary age; and Man, of the present age. Of course, very many other kinds of living things existed with these in each of the ages, just as all the kinds exist, with man as the leading creature, now.

94. **Other Names of the Geological Ages.**—Because the kinds of living things mentioned in the last paragraph were the leading ones, the Lower and Upper Silurian ages together, are called the Age of Mollusks; the Devonian, the Age of Fishes; the Carboniferous, the Age of Coal Plants; the Mesozoic, the Age of Reptiles; and the Tertiary, the Age of Mammals.

95. **Divisions of Strata.**—Rocky strata have been accumulating ever since the beginning. Those which accumulated in an epoch are called a *formation.* A thick stratum, or a collection of strata, less than a formation, is often called a bed. Those formations that were produced during a period are called a *group.* Those groups of formations that were made in an age are called a *system.* Thus, for example, the formations and groups of the first, or oldest, age, constitute the Lower Silurian System, and those of the third, or Devonian, age, constitute the Devonian System, etc.

96. **The Glacial Epoch.**—Geologists find evidence that at the close of the Tertiary age the climate of those parts of the earth that were before, and are now, temperate, became extremely cold. The

evidence leaves little or no doubt that the land of both the northern and southern hemispheres, as far as the 39th or 40th parallel of latitude, was covered with ice all the year round, just as a large part of Greenland now is. The ice accumulated from falling snow, just as it now accumulates upon the glaciers of Greenland and the Alps, until it reached, in some places at least, many hundred feet thick. In fact, this great ice-sheet was merely a wide-spread glacier, covering the country and moving southward constantly, but very slowly. In the interior states we find evidence that the ice reached far south of the Ohio river before it came to a climate warm enough to melt it as fast as it moved southward. We also find evidence that the Allegheny and Rocky mountains had glaciers upon them just as the Alps have now.

After a long epoch the former mildness of the climate returned and the ice gradually disappeared by melting, until its most southern borders are now found within the Arctic Circle.

97. **The Drift.**—The motion of the great, heavy ice-sheet over the formations upon which it rested, ground a part of them up very fine and mixed the soft material with the sand, gravel, and boulders. This finely pulverized rock constitutes most of the soil, and also the greater part of the deposit called the drift. The drift consists of all the loose, earthy material above the stratified rocks in the region the glaciers once occupied. A great part of the drift is clay, but clay is nothing more than partly decomposed and pulverized rock. Scattered throughout the drift are granite and other boulders, which the ice brought from the northward. Some of these we now find upon the surface, but the greater part of them are covered from sight.

98. **Origin of Rock Material.**—It might be supposed that the earth has become larger by the accumulation of strata upon each other. That is not the case. The earth has not increased a pound in weight since the first stratified rocks were formed, except by the meteors that have fallen upon it. All the material of which the stratified rocks are composed has been derived from rocks that existed before. A great part even of the stratified rocks themselves have become decomposed, the material having been removed and deposited in water, again to become other stratified rocks.

CHAPTER VII.

IOWA GEOLOGY.

99. Rocks of Iowa Mostly Covered from Sight.—There can be no doubt that the whole state is underlaid by stratified rocks belonging to various formations. They are, however, largely covered from sight by the drift and other loose deposits, so that they are seldom seen except in the valley sides and in the banks of streams. They are most abundantly exposed to view in the eastern part of the state, especially in those counties of the northeastern part which adjoin the Mississippi. In many whole counties of Iowa, especially the northwestern ones, no rocks at all are to be seen except a few boulders and pebbles.

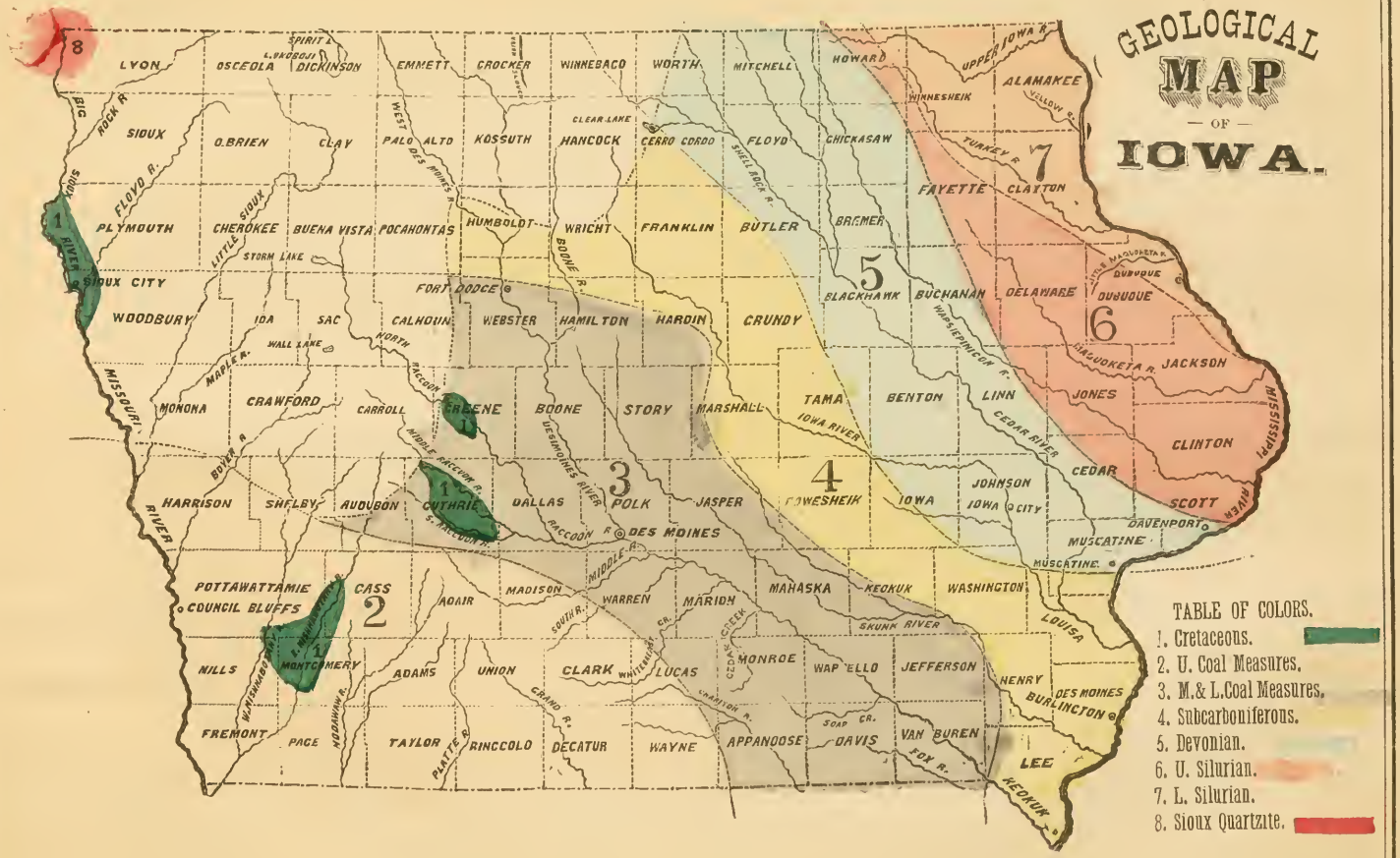
100. The Formations of Iowa.—By studying the rocks wherever it is possible to see them, we learn what different formations underlie the surface of the state, and also to what geological ages they belong. The following table gives the names of those formations in their order, beginning at the bottom with the oldest formation. It also shows the group and system to which each formation belongs.

Table of the Geological Formations of Iowa.

Systems. (*Ages.*)	Groups. (*Periods.*)	Formations. (*Epochs.*)
	Post-Tertiary.	Drift.
Cretaceous.	Earlier Cretaceous.	Chalky Beds.
		Woodbury Sandstone and Shales.
		Nishnabotany Sandstone.
Carboniferous.	Coal Measures.	Upper Coalmeasures.
		Middle Coalmeasures.
		Lower Coalmeasures.
	Sub-Carboniferous.	St. Louis Limestone.
		Keokuk Limestone.
		Burlington Limestone.
		Kinderhook Beds.
Devonian.	Hamilton.	Hamilton Limestone and Shales.
Upper Silurian.	Niagara.	Niagara Limestone.
Lower Silurian.	Cincinnati.	Maquoketa Shales
	Trenton.	Galena Limestone.
		Trenton Limestone.
	Primordial.	St. Peter's Sandstone.
		Lower Magnesian Limestone.
		Potsdam Sandstone.
Azoic.	Huronian.	Sioux Quartzite.

101. Position of the Formations in relation to each other.—It is true, these formations lie, the one upon the other, but each does not entirely cover the next lower. They *lap* upon each other, the edges of most of them being directed to the northeastward. Each one of them occupies a greater or less space of country before it is covered from sight by the lapping on of the next. Although the formations do lap upon, and dip beneath, each other, as mentioned, they are all so nearly level that the eye cannot detect any but the local or short dips.

102. Explanation of the Geological Map.—The accompanying geological map shows, by different colors, in what parts of the state the rocks, belonging to the


GEOLOGICAL
MAP
— OF —
IOWA.
TABLE OF COLORS.
1. Cretaceous.
2. U. Coal Measures.
3. M.& L.Coal Measures.
4. Subcarboniferous.
5. Devonian.
6. U. Silurian.
7. L. Silurian.
8. Sioux Quartzite.
LYON
OSCEOLA
DICKINSON
EMMETT
CROCKER
WINNEBAGO
WORTH
MITCHELL
HOWARD
ALAMAKEE
WINNESHEIK
SIOUX
O.BRIEN
CLAY
PALO ALTO
KOSSUTH
HANCOCK
CERRO GORDO
FLOYD
CHICKASAW
FAYETTE
CLAYTON
PLYMOUTH
CHEROKEE
BUENA VISTA
POCAHONTAS
HUMBOLDT
WRIGHT
FRANKLIN
BUTLER
BREMER
BLACKHAWK
BUCHANAN
DELAWARE
DUBUQUE
SIOUX CITY
FORT DODGE
WOODBURY
IDA
SAC
CALHOUN
WEBSTER
HAMILTON
HARDIN
GRUNDY
JACKSON
JONES
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
STORY
MARSHALL
TAMA
BENTON
LINN
CLINTON
HARRISON
SHELBY
AUDUBON
GUTHRIE
DALLAS
POLK
JASPER
POWESHEIK
IOWA
JOHNSON
IOWA CITY
SCOTT
DAVENPORT
DES MOINES
CEDAR
MUSCATINE
POTTAWATTAMIE
COUNCIL BLUFFS
CASS
ADAIR
MADISON
WARREN
MARION
MAHASKA
KEOKUK
WASHINGTON
LOUISA
NILLS
MONTGOMERY
ADAMS
UNION
CLARK
LUCAS
MONROE
WAPELLO
JEFFERSON
HENRY
BURLINGTON
FREMONT
PAGE
TAYLOR
RINGGOLD
DECATUR
WAYNE
APPANOOSE
DAVIS
VAN BUREN
LEE
KEOKUK
MISSOURI RIVER
BIG SIOUX RIVER
ROCK R.
FLOYD R.
LITTLE SIOUX
MAPLE R.
BOYER R.
NISHNABOTNA R.
NODAWAY R.
PLATTE R.
GRAND R.
CHARITON R.
WHITE BREAST CR.
CEDAR CREEK
SOAP CR.
DES MOINES R.
RACCOON R.
MIDDLE RACCOON R.
S. RACCOON R.
SOUTH R.
SKUNK RIVER
IOWA RIVER
CEDAR RIVER
WAPSIPINICON R.
TURKEY R.
YELLOW R.
UPPER IOWA R.
MISSISSIPPI RIVER

different ages, are to be found naturally exposed, or near the surface. The map is too small to be colored so as to show every formation well; so the ages only, in most cases, are shown. The part of the map colored yellow and numbered 7 represents the part of the state where the rocks of the Lower Silurian age are found. They are to be *seen* only in that part, but they are believed to extend beneath all the other formations of the state except the Sioux Quartzite (No. 8). Next is the Upper Silurian, colored red (No. 6). The edge of it next to the yellow, shows where the formation thins out on the Lower Silurian and the other edge shows where it dips beneath the Devonian (No. 5), which is colored blue. The Devonian thins out upon the Upper Silurian and dips beneath the Sub-Carboniferous (No. 4), which is colored brown. The dark color (No. 3) represents the coalfield, or that part of the state which is occupied by the Upper and Lower Coalmeasures together. These two formations contain all, or nearly all, the coal of the state. The coal-bearing strata thin out upon the Sub-Carboniferous and dip beneath the Upper Coalmeasure formation (No. 2), which is represented by a neutral tint. The green spots (No. 1) show where rocks of Cretaceous age have been found. In all that large part of the state represented by the uncolored portion of the map the drift has so covered the strata that no rock, except boulders, have been found.

103. **The Sioux Quartzite** is a very hard, brick-red rock. Within the state, it is found in ledges only in the extreme northwest corner, but it may be found abundantly in the adjacent parts of Dakota and Minnesota. It is probably of Azoic age, but that fact is not known with certainty. In the southwestern part of Minnesota a layer of red pipestone is found in the Sioux Quartzite. This is the place which is celebrated in Longfellow's "Song of Hiawatha" as the one where the Great Spirit taught the Indians to make pipes from the stone.

104. **The Potsdam Sandstone** is usually of a dirty yellowish color, and too soft for building purposes. It may be seen in the base of the bluffs at the cities of McGregor and Lansing, and also in a similar position in the bluffs of the Mississippi between those cities. It may also be seen in the base of the bluffs of the Upper Iowa for a few miles from its mouth.

105. **The Lower Magnesian Limestone** is a light-brown, rough looking rock. The greater part of it is too rough for building purposes, but in some parts it is very good. It may be seen resting upon the Potsdam Sandstone at McGregor, Lansing and at other places between those cities, along the bluffs of the Mississippi; also, in the bluffs of the Yellow and Upper Iowa rivers for a distance of several miles from their mouths.

106. **The St. Peter's Sandstone** is also a soft sandstone, usually of a light-gray color, but sometimes variegated. At a place a couple of miles below McGregor

it is variously colored by oxide of iron, and is known by the name of "Pictured Rocks." The formation may be seen near the top of the bluffs at McGregor and other places, resting upon the Lower Magnesian Limestone.

107. **The Trenton Limestone.**—This formation is in some places a blueish limestone, good for building purposes and for lime, but in others it is shaly and of no value. It may be seen at the following, beside other, places: Guttenburg, McGregor, Waukon, and Decorah; also, in the valley sides of the Upper Iowa river, from Decorah up to the state boundary, and in the valley of Turkey river, from the mouth of the Volga to Fort Atkinson. Many fossils are found at various places in this formation.

108. **The Galena Limestone** is magnesian, and in appearance, much like the Lower Magnesian Limestone. It was so named from the galena (lead ore) which is found in it. It may be seen at the following, beside other, places: Dubuque, Garnavillo, near Elkader, Clermont, and also along nearly the whole valley of Turkey river, where it may be seen resting upon the Trenton limestone. A few fossils are occasionally found in it, but they are not common.

109. **The Maquoketa Shales** are so called from the Little Maquoketa river, in the valley of which the formation is freely exposed. It is in some parts quite clayey, and in others shaly, with an occasional layer of impure magnesian limestone. This formation occupies a very narrow strip of the country, running parallel with, and two or three miles from, turkey river, on its south side. It continues thence southward, parallel with the Mississippi, through Dubuque, and extends as far as Bellevue, in Jackson county. Many fossils are to be found in it at some places, especially in the valley of the Little Maquoketa, about twelve miles west of Dubuque.

The formations described in the last six paragraphs belong to the Lower Silurian age, as may be seen by the table in paragraph 100. They are also all included in the space represented by the yellow color upon the map.

110. **The Niagara Limestone** is so called because it is the western continuation of the formation over which the waters leap at Niagara Falls. It is the only formation of Upper Silurian age in Iowa, and occupies all that part of the State represented by the red space upon the map. It consists of magnesian limestone, and often has much flinty material mixed with it. It often resembles the Galena, and also Lower Magnesian Limestone formation, but at some places, as at Anamosa and LeClaire, it is evenly bedded. It may be seen in the bluffs of the Mississippi between LeClaire and Bellevue, and also in the bluffs and valley sides of the other rivers which traverse the part of the state which the formation occupies. There have been many fossils in this formation, but in most cases only the cavities they once filled now remain.

111. **The Hamilton Limestone and Shales** constitute the only formation of Devonian age in Iowa. It occupies that large space represented by the blue color upon the map. It consists of clayey shales, shaly limestone, and of limestone in more or less regular layers, a few of which, in some places, are magnesian. The old State Capitol (now "Middle Hall" of the State University,) is built of stone from this formation. The small pieces of stone often worked into paper-weights and other ornamental objects and called "Iowa City Marble," or "Bird's-Eye Marble," are really fossil corals, obtained from this formation. These were of course formed by polyps, as corals now are, but they have since become solid rock. The formation affords many fossils at some places, the most noted of which is near Rockford, in Floyd county. The rocks of this formation are to be seen frequently exposed in the valleys of all the streams of the region represented by the blue space on the map.

112. **The Sub-Carboniferous Group.** —There are four formations of this group in Iowa, as is shown by the table in paragraph 100. The space they occupy is represented by the brown color upon the map, and they are described in the four following paragraphs: —

113. **The Kinderhook Beds** consist of various kinds of rock constituting different beds, and which also vary at different places. At Burlington they consist principally of fine grained sandstone, sometimes quite clayey. One bed there is oolitic limestone. At Orford, Tama county, the formation is mostly oolitic limestone. At LeGrand, Marshall county, it is drab-colored, or variegated limestone, some of it magnesian. At Iowa Falls it is gray limestone below, and rough, magnesian limestone above. At Springvale, in Humboldt county, the rock is oolitic limestone below, and magnesian limestone above. Here the latter is good building rock.

114. **The Burlington Limestone** is so called from the city of Burlington where the formation may be seen in the bluffs of the Mississippi. It may also be seen in the bluffs, from near the mouth of Iowa river to the mouth of Skunk river. It may be found also at many other places in Des Moines, Louisa, and Washington counties. This formination has become noted, both in our own and foreign countries, for the many kinds and great numbers of the fossils called *crinoids* that have been found in it, especially at Burlington.

115. **The Keokuk Limestone** takes its name from the city of Keokuk, where many quarries are worked in it. It may be seen in all the bluffs between Montrose and Keokuk, and also at Bentonsport, on the Des Moines river, and other places. It is in the upper part of this formation that those hollow masses of rock, lined with crystals, called *geodes*, are found. Many interesting fossils have been found in the Keokuk limestone, at various places.

116. **The St. Louis Limestone** takes its name from the city of St. Louis, Missouri, but the same formation is found in Iowa and the adjoining states also. It may be seen more or less fully exposed at the following places, besides many others. Fort Dodge, near Webster City, near Pella, at Ottumwa, Farmington, and near Keokuk. This formation consists principally of compact gray limestone, but layers of magnesian limestone also are often found in it, and sometimes a bed of soft sandstone in addition. Fossils are often found in the clayey spaces between the layers of limestone. One of the best known localities for them is near Pella, Marion county.

117. **The Coalmeasures.**—The name "coalmeasures" is an old term, first used by English miners. It is now used only as a common name for the group of formations that contain the coal. This group comes next above the Sub-carboniferous group. In Iowa the group is divided into three formations, called the Lower, Middle, and Upper Coalmeasures.

118. **The Lower and Middle Coalmeasures** occupy that part of Iowa which is represented by the dark color upon the map. This region is called the Iowa coal-field. The two formations are not very distinct from each other. They both contain beds of coal, the thickest being in the Lower. They are made up of beds of sandstone, shales, and clay, with rarely a thin bed of impure limestone. The beds of coal lie between these beds of rock, just as if they were also beds of rock, which indeed, geologically speaking, they are. A bed of coal may be only a few inches thick, but some of them are six or eight feet thick. There is usually a bed of shale resting upon, and a bed of clay immediately under each coal bed. This clay is often used for making common pottery. The other rocks of these formations are not often valuable, but some of the sandstone is suitable for building purposes, though generally too soft. The sandstone has usually a dirty yellow color, but at Red Rock, in Marion county, and at some other places it is colored red by oxide of iron. Bluffs of this sandstone may be seen near Eldora and Steamboat Rock, in Hardin county; at Red Rock and other places in Marion county, in the valley-side of the Des Moines, a little below Ottumwa, and elsewhere. Besides the formations of the coalfield, coalmeasure strata, and in a few cases, some coal with them, have been found at various places, more or less distant from its borders. These are small, separate deposits and are called outliers. One of them, much larger than any of the others, contains several coal mines. It is near the Mississippi, extending from Muscatine nearly to Davenport. Fossil plants are often found in the shales of the coal measures, and occasionally other fossils, also, such as shells, &c.

119. **The Upper Coalmeasures** occupy that part of the state represented by

the neutral tint upon the map. Much of this formation is limestone, but it also contains sandstones, shales, and some clay. Geologists, for certain reasons, give this formation the name it bears, but it really contains very little coal, in most places, none. In the valley of the Nodaway river, in Adams, Taylor, and Page counties, a little coal is found in this formation. Its rocks are to be seen abundantly in the valleys of Middle, North and South rivers in Madison county; in the valley of Grand river in Decatur county, and at many other places in the region represented by the neutral tint upon the map. The formation contains many fossils, some of which may be found at almost any of the places where the limestone appears.

120. **Cretaceous Rocks.**—A large part of western and northwestern Iowa was doubtless at one time occupied by rocks of Cretaceous age. If so, they have been either mostly removed by glacial action, or covered up by drift, for they are now to be seen at only a few places. Rocks of this age have been found in Montgomery, Cass, Pottawattamie, Guthrie, Greene, Woodbury, Plymouth, and Sioux counties. The places where these rocks have been found are represented by the green color upon the map.

121. **The Nishnabotany Sandstone** only, of the Cretaceous formations, has been found in Montgomery, Cass, Pottawattamie, Guthrie, and Greene counties. In some places it has been seen resting upon the Upper coalmeasure limestone. It is a coarse, usually soft sandstone, and sometimes pebbly. It varies in color from dirty yellow to dark brown. At Lewis, in Cass county, the dark brown stone has been used for building purposes.

122. **The Woodbury Sandstone and Shales** are to be seen in the bank of the Missouri, at Sioux City, and also at various points in the bluffs of the Big Sioux, within seven miles of Sioux City.

123. **The Chalky Beds** are called by geologists the Inoceramus beds. They are found in the valley-side of the Big Sioux, resting upon the Woodbury sandstone and shales. They are made up of light gray, chalky material, and soft, shaly limestone. In some places they also contain a little true chalk, which however is usually too impure for use.

124. **The Drift.**—The general character of drift has been described in paragraph 97. The upper part of it in Iowa being soil and sub-soil, we see it almost everywhere. It is that which we commonly call "the ground" and into which we dig to make cellars, wells, &c. (The ground of those counties which border the Missouri river is different from that of the drift. It is described in paragraph 128. The ground of the bottom lands is also not drift. See paragraph 131.)

At the close of the Glacial epoch, the drift doubtless covered up all the stratified rocks in Iowa, and the rivers have

since made their own valleys. In doing so they have washed out and carried off the drift down to the stratified rocks in some places. We also find that in some places the valleys have been worn still deeper and we see the edges of the strata projecting from the valley-sides. In some parts of the state the drift is not far from two hundred feet deep. Everywhere, away from the valleys, it is usually so thick that the wells dug in it do not reach the bottom of it. There is usually much clay mixed with the other material of the drift, so that it is sometimes very hard and difficult to dig, but it is never changed into rock.

125. **The Boulders.** — Boulders of granite, or more properly, of syenite, are to be found, at least in small numbers, in almost all parts of the state. These have been brought by the ice from Minnesota where ledges of that kind of rock abound. West of the Des Moines river boulders of Sioux quartzite are to be found in addition to the others. These came from southwestern Minnesota, where ledges of that quartzite are plentiful. A few boulders of other kinds of rock are occasionally found with these, but not many. In some parts of the state *very* few boulders of any kind are to be found in the drift. No where in Iowa are they so plentiful as they are in some other regions. Occasionally the granite boulders are very large. Some of them when broken up have furnished large quantities of the most durable building stone.

126. **Drift Scratches.**—Boulders are sometimes found, having one side flattened and scored in straight lines. Sometimes also, the top layer of rock in quarries is found with its upper surface leveled off and scored in a similar manner. The boulders were frozen fast in the bottom of the great ice-sheet, and as this moved over the ledges the boulders and ledges leveled and scored each other.

127. **Objects found in the Drift.**— Sometimes pieces of lead-ore and copper have been found in the drift of Iowa, causing many to believe that mines of those valuable metals might be opened where the specimens were found. Such specimens were doubtless brought from places hundreds of miles distant, by the ice, and in the same manner that it brought the boulders. Sometimes logs and branches of trees are found in the drift when wells or cellars are dug. Before the Glacial epoch, trees grew as they are growing now, and when the ice came, parts of some of them were buried in the drift. Deeply covered from the atmosphere they could not decay, and they have remained comparatively sound to this day.

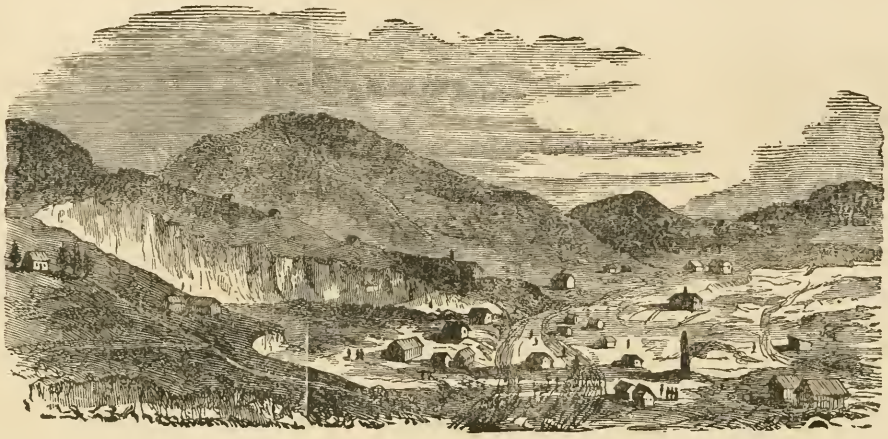
128. **The Bluff Deposit.** — The "ground" of a part of western Iowa consists of a deposit different from the drift. It is called the Bluff deposit, because it forms the bulk of the bluffs of the Missouri river. It has the appearance of fine earth, without gravel or stones, except a few stony lumps, and is all alike, from

top to bottom, even when it is two hundred feet thick. This deposit occupies the surface of all the counties of Iowa which border upon the Missouri, and it also extends as far east as the western portions of Page, Montgomery, and Shelby counties. The Bluff deposit rests upon the drift, as may be seen at the base of some of the Missouri bluffs, and in the valleys of some of the smaller rivers. The drift is thinner there, however, than it is in most other parts of the state. It is not only in Iowa that this deposit is found, but it extends far into Nebraska, Missouri, and Kansas.

129. **Peculiarities.** — The Bluff deposit has some striking peculiarities. It may be easily dug with a spade, and yet the sides of cellars, wells, and other excavations made in it will stand without crumbling or change for several years, even when exposed to frost and rains.

130. **Origin of the Bluff Deposit.**— Geologists believe it was deposited as sediment in a lake-like expansion of the Missouri river immediately after the close of the Glacial epoch. The lake became filled with the abundant sediment of that muddy river before that portion of its channel below had cut its valley out to any considerable depth. Afterward, as the valley below was deepened by the wearing of the current, it also easily swept out a valley in the sediment which its own waters had deposited before. When this was done the high bluffs of dried mud remained on each side of the valley, as we see them now.

131. **Alluvium.** — The "ground" of the river bottoms is called alluvium, but by some authors it is called "River drift." It is composed of whatever materials the river floods may have disturbed in their course and deposited again. It is largely re-arranged glacial drift in most of the valleys of Iowa, but in the region occupied by the Bluff deposit that material forms the greater part of the alluvium.



CHAPTER VIII.

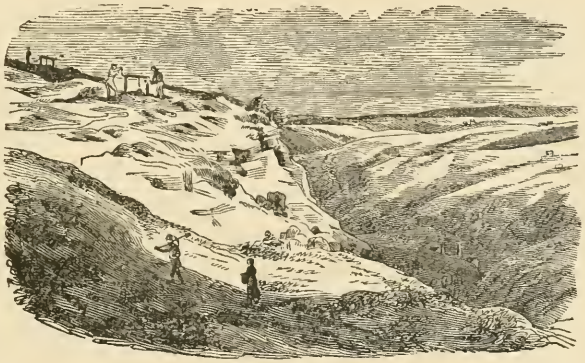
MINERAL RESOURCES.

132. The Iowa Coal Field contains at least seven thousand square miles, and the coal it contains is practically inexhaustable. Coal, than, constitutes one of the most important products of the state. It is shown in paragraph 102, that the coal-bearing formations of Iowa dip beneath the upper, or unproductive coal-measures. Therefore there is good reason to believe that the present known coal-field may be greatly enlarged by finding coal deep beneath the Upper coal-measures in southwestern Iowa.

133. How Coal is Found. — Coal may not be invariably found at any place within the coal field. Several different beds are known to exist there, and sometimes a bed is known to extend continuously for a long distance. But if one should dig down at any chosen place he might pass through one or more beds of coal, or he might find none at all. Coal is found in beds with layers of rock lying parallel above and below them. Coal beds are often, but improperly, called veins. In Iowa the coal beds, as well as the stratified rocks among which they are found, are nearly level. They are usually first discovered in the valley-sides of rivers or creeks. The wearing out of the valleys has often left the edges of the coal beds, as well as of the other strata, near the sloping surface, or sometimes even fully exposed.

134. Coal Mines.—At present, coal in Iowa is mostly mined by "drifting." That is, by digging a horizontal way, called an *entry*, into the coal bed from the valley side. Then passages are dug out into the coal bed from each side of the

entry, and *rooms* are dug on each side of the passages. When a bed of coal is known to exist at a certain place beneath the surface, a *shaft* is dug down to it and then the entries, passages, and rooms are dug as before. All the coal finds its way out by the main entry, either to the mouth of the mine in the valley side, or to the shaft, where it is raised to the surface by a windlass. Shale usually forms the roof, and clay the floor of a mine. Pillars of coal are left at frequent intervals to keep the roof from falling. Strong posts of wood, called *props*, are also much used for the same purpose.



The mines of Fort Dodge, Moingona, Des Moines, and Oskaloosa are among the most noted, but many others are worked in various parts of the coal field.

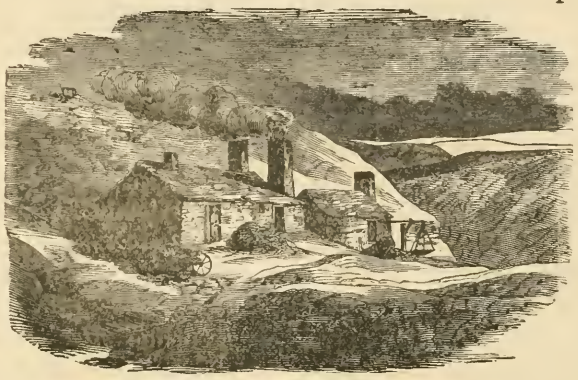
135. **How the Miners Work.**—Most of the coal mines are too low for a man to stand upright in them, so the miners must stoop, or lie partly on their side. Small wooden railways are laid along the center of all the entries and passages, and also into the rooms where the miners work. On these rails small cars are made to run. In the smaller mines the cars are pushed by the miners, but in some of the larger they are drawn by small mules. Each miner is provided with a small tin lamp, a pick-axe, a large hammer, and some iron wedges. The lamp is fixed in the front of his cap by a wire hook. Lying partly on his side upon the bottom of the mine he digs out with his pick-axe a narrow groove from the bottom of the coal bed, as far under as he can reach. Then, driving the iron wedges in at the top, between the coal and the roof, he throws the coal down upon the bottom of the mine. It is then put into the cars and run out. Sometimes the coal is thrown down by a blast of powder instead of the wedges and hammer.

136. **The Coal** of Iowa is bituminous. A little cannel coal is sometimes found, but it is usually too impure to be of any practical value. No anthracite coal is found in the state.

137. **Metals.**—Except lead, no metals of value have been found in the state. At some places considerable quantities of good iron-ore have been found, but the amount was too small and the supply too uncertain to make it valuable.

138. **Lead.**—Lead ore has for many years been mined in large quantities at Dubuque and in the region immediately

around the city. The ore is found in deep, narrow crevices and caves in the Galena limestone formation. The crevices are often to narrow to allow a man to pass in them, until they are widened, but



sometimes they are several feet wide, and vary much in height. They may be often followed for long distances under ground. Most of them run east and west, but a part of them, north and south. The ore is smelted in furnaces made for the purpose, wood being principally used for fuel. The melted lead runs from the furnace into a cauldron, from which it is dipped out and cast, in moulds, into short bars, called pigs, which weigh about seventy pounds apiece. Several years ago small quantities of lead ore were found in the Lower Magnesian limestone, in the valley of the Upper Iowa, but the quantity was too small to be valuable.

139. **Gypsum.**—At Fort Dodge and in its vicinity gypsum is found in *very great quantities.* In other places gypsum occurs in irregular heaps or deposits, but at Fort Dodge it is found in the condition of stratified rock, and quarries in it look like ordinary limestone quarries. Gypsum is so soft that it may be cut with a knife, or easily broken and ground to powder. It is therefore easily quarried and worked into desired shapes. Several fine dwelling houses have been built of it in Fort Dodge, the gypsum being used for the walls, just as common stone is used. Such walls have a pleasant gray color.

140. **"Plaster."**—Where gypsum is merely ground to a fine powder, without any other preparation, it is called "plaster." In that condition it is used by farmers for fertilizing grass and corn lands, &c.

141. **Plaster of Paris.**—This is the ground gypsum or "plaster" heated over a fire until the water of crystalization is expelled. When plaster of paris is mixed with water it quickly becomes hard or "sets." It is used in the arts for various purposes, such as the making of stucco cornices in rooms, ornaments, &c. The brass tops of our glass lamps are fastened on with it.

142. **Stone,** suitable for buildings, bridge piers, &c., is to be found principally in the bluffs and valley sides, but in a few places some large granite boulders have furnished good building stone. The various kinds of rock are mentioned in paragraphs 103 to 122. The eastern half

of the state is very well supplied with stone. In the southwestern quarter, except in Decatur county, stone is not plentiful. A large part of the northwestern quarter of the state is destitute of stone, especially the broad space between the Des Moines and the Big Sioux rivers.

143. **Lime.**—Almost any of the common limestone, and much of the magnesian limestone also, which is mentioned in Chapter VII. may be burned into lime. The chalky beds of Plymouth county are also much used there for making lime. The state is therefore well supplied with this useful article, some of which is very superior.

144. **Brick Clay.**—A large part of the brick used in Iowa are made of the clayey soil and sub-soil, especially that of the region occupied by the drift. They are also often made from the clay of the deeper parts of the drift. Brick material is therefore abundant in almost all parts of the state.

145. **Potters' Clay** is found at many places in the state, especially within the coal field, where the under-clay of the coal beds has furnished it. It is suitable only for coarse vessels, such as jars, jugs, crocks, &c., of which large quantities are made at different places.

146. **Sand,** suitable for morter and all other ordinary purposes, is to be found at low water in all the river beds of the state.

CHAPTER IX.

THE SOIL.

147. **General Characters.**—Iowa is justly famous for the fertility of its soil. In some countries most of the tillable soil is found in the valleys, the hills being generally rocky and barren. But the whole surface of Iowa in tillable except the small portion of it which is occupied by rivers, lakes, ponds, rocky bluffs, &c. The surface of the soil is generally so nearly level that farm work is not difficult and farm machinery may be easily used. There are three distinct kinds of soil in the state, namely, the Drift, Bluff, and Alluvial soils.

148. **The Drift Soil** is formed of the surface portion of the drift deposit described in paragraph 124. It is therefore the soil of the greater part of the state. It consists of a dark loam, from one to two feet deep, and sometimes more, on the prairies. It is so fertile that some

farms upon it have been cultivated successfully for more than twenty years without artificial fertilization of any kind. Stones are seldom seen in it, especially upon the prairies, and as there are of course no stumps, there is nothing to impede the plow.

149. **The Bluff Soil** is the surface portion of the Bluff deposit described in paragraph 128, and is consequently found wherever that deposit exists. It is fully as fertile as the drift soil, and as it contains only a *very* small amount of clay in its composition it does not become so muddy when wet. This is a great advantage because it may be plowed earlier in the spring than clayey soils, and also sooner after a rain. As there are no stones, not even boulders, in this soil, there is nothing to impede the working of farm implements and machinery.

150. **The Alluvial Soil.**—This is the soil of the bottom lands. The material of which it is composed has been disturbed or transported by the rivers. If they flow over the drift, that deposit furnishes material for alluvial soil. In most of the valleys of western and southwestern Iowa the bluff deposit has contributed largely to the formation of alluvial soil. The alluvial soil of the Mississippi bottom is largely altered drift, while that of the Missouri is largely bluff deposit. Since so much decomposed animal and vegetable matter has been brought down by the rivers and mixed with the alluvial soils, they are among the most fertile and durable in the world.

CHAPTER X.

PRODUCTIONS OF THE SOIL.

Section 1. *Native Productions.*

151. Distribution of Native Plants.—It has been shown that the surface of the state is very uniform. The character of the soil has a great degree of uniformity as regards its fitness for the growth of vegetation. Therefore there is great uniformity of native vegetation throughout the state, although some plants seem to flourish a little better in some places than in others. If the seeds of any of them are planted in any other part of the state they usually grow well. There are some exceptions, as for example the paw-paw and persimmon. They are not known to ripen their fruit north of Burlington.

152. **Forest Trees.**—The most common kinds of forest trees are four or five kinds of oak, common elm, cotton wood, black walnut, hickory, sugar maple, soft maple, and linden. Among those less abundant are buckeye, aspen, water birch, wild cherry, ash, box elder, white walnut, or butternut, sycamore, and slippery elm. Such trees as the soft maple, cotton wood, black walnut, and buckeye grow naturally upon the bottom lands, but they will also grow thriftily upon all varieties of soil in the state if either transplanted or grown from the seed. A few pine trees are found growing in the eastern part of Iowa, upon such bluffs as have sandstone or flinty material in their composition. Red cedar is also found growing in many of the rocky bluffs bordering the rivers. The chestnut, beech, and poplar or tulip tree, all so common in the middle and eastern states, do not grow naturally in Iowa.

153. **Native Fruits.**—Wild grapes, plums, crab apples, cherries, blackberries, raspberries, gooseberries, and strawberries grow in the woodlands and thickets of all parts of the state. It is true they are of little value compared with cultivated kinds, but they serve to indicate that *some* cultivated kinds may be successfully grown where these grow naturally.

154. **Nuts.**—Hickory and hazel nuts are plentiful in the woodland regions. Black walnuts and butternuts are common upon the bottom lands of eastern Iowa, and a few pecan nuts are found upon the bottom lands of Lee and Des Moines counties. Oaks being among the most common of the forest trees, acorns are plentiful and are sometimes used by the farmers to assist in fattening hogs.

155. **Wild Hay.**—The prairie grass is used for hay by the farmers who live near uncultivated prairies. This wild hay may be obtained so cheaply that cultivated grasses, although much better, are not generally grown until all the prairie land in the neighborhood is occupied. Wild hay has been of *very great* value to Iowa, and many thousands of cattle are now pastured upon the prairie grass every season.

156. **Wild Rice.**—A kind of coarse grass called wild rice grows in the shallow ponds of northern Iowa. It was formerly used as food by the Indians. The seeds are slender, nutritious grains, but far inferior to common rice, and it is of no practical value compared with cultivated grains.

Section 2. Cultivated Productions.

157. **Uniformity of Crops, in different parts of the State.**—Since there is so great uniformity of distribution of the native plants of the state, one would naturally expect the cultivated productions to grow equally well in all parts also. This is generally the case, the exceptions being very few and influenced mainly by variation of the soil.

158. **Grain.**— Iowa is famous as a grain-growing state. The cultivated grains are corn, wheat, oats, barley, rye and buckwheat. Large quantities of the first four kinds are annually exported to other states and countries.

159. **Grasses and Clover.** — Timothy grass and red clover are the principal kinds cultivated for hay, and blue grass and white clover for lawns and pasturage. Much hay, pressed into bales, is annually exported from the state.

160. **Flax** is very commonly cultivated, principally for its seed from which to make linseed oil. The fibre of the stalk is much used for ropes. If manufactories were established for the purpose, it would furnish the proper material for linen cloth.

161. **Hemp and Hops** both grow well in Iowa. Hops do well upon some upland soils, but hemp grows most luxuriantly upon the rich alluvial soil.

162. **Sorghum** was formerly much cultivated for molasses, but its cultivation is now greatly diminished.

163. **Potatoes** of the best quality are cultivated in great abundance, and many thousands of bushels are annually exported. *Sweet potatoes* are grown successfully in the southern part of the state.

164. **Garden Vegetables** of all the kinds common in temperate climates grow well in all parts of Iowa.

165. **Apples and Pears.** — Apples grow plentifully in all parts of the state. The State Agricultural Society has published the names of varieties of apples in three sets of one dozen each. One of

these sets is recommended as best suited to the northern, one to the central, and one to the southern part of the state. *Pears* grow well, but they have not yet become common, except in a few counties.

166. **Peaches.**—Almost the whole of Iowa is beyond the northern limit of successful peach-growing. In the southern part of the state trees often live to produce a few good crops of fruit, but they are liable to be killed entirely by severe winters.

167. **Grapes** of some of the cultivated varieties are grown successfully in all parts of the state. The two most noted varieties are the Catawba and the Concord, but several others are highly esteemed. The Catawba is grown mostly in southern Iowa, but the Concord is hardy in all parts of the state, and has become the most common grape in the markets.

168. **Plums** would grow abundantly if the fruit was not so generally destroyed by the insect called curculio.

169. **Gooseberries, Raspberries, Currants, and Strawberries** all grow abundantly and finely.

170. **Tree Culture.**— All varieties of native trees will grow well upon all varieties of the soil of Iowa if they are either transplanted or grown from the seed. Therefore the soil will produce a crop of fuel as certainly as it will a crop of food. Not only will the native trees grow well, but many that are not native will grow equally well also. Such, for example, as both the American and European larches, chestnut, evergreens, &c.

171. **Hedges.**—The only hedge plant that has proved really successful in Iowa is the osage orange. It seldom succeeds well, however, north of the southern part of the state. Some other shrubs and trees have been tried for hedges, but without success.

GAME BIRDS AND THEIR HAUNTS—QUAIL.

CHAPTER XI.

ANIMALS.

172. **The Domestic Animals and Birds** of Iowa are such as are common in all temperate climates, namely, — the horse, ox, sheep, hog, and the common fowl, turkey, goose, and ducks. Corn and grass are so abundant for feeding domestic animals that Iowa has become one of the most important parts of the nation for the production of *beef*, *pork*, and *wool* for exportation. Large quantities of poultry, eggs, butter, cheese, and honey are also annually exported.

173. **Wild Animals and Birds.** — When a country becomes settled the wild animals and birds, as a rule, become fewer, and many kinds entirely disappear. There are some exceptions, however, es-

pecially in the case of birds. Some kinds of birds either get better food from cultivated fields, or they are more protected from their natural enemies by the presence of man. Quails, robins, swallows, and some other kinds are more plentiful than they were when the state began to be settled. Only the principal kinds of wild animals and birds are mentioned in the following paragraphs. When it is not otherwise stated, they are to be found in all parts of the state.

176. **Fur Animals.** — A very few beavers and otters are still found in some of the rivers. Muskrats, minks, and raccoons are often met with, and foxes are occasionally seen. A few opossums are found in southern Iowa.

174. **The Buffalo and Elk** were formerly abundant in Iowa. The former has now entirely disappeared, and the latter only occasionally comes into the north-western part of the state.

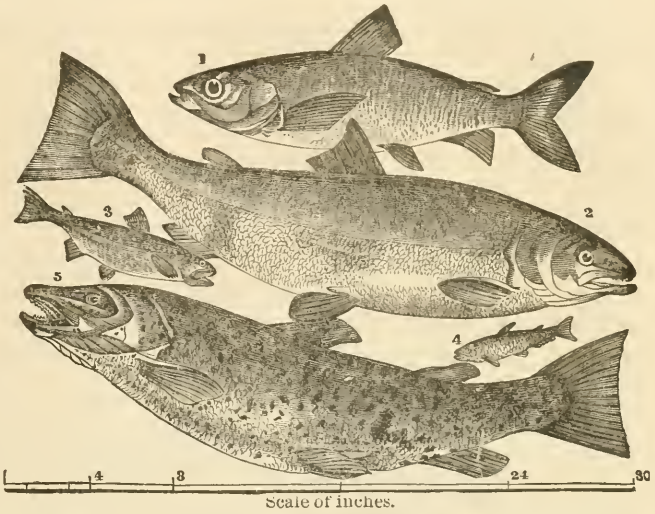
175. **The Deer** is still to be found in the thickly wooded districts of all parts of the state, but it is much more rarely seen than formerly.

177. **Ferocious Animals.** — No animals that need be feared by man are now found in Iowa. When the state was first settled a solitary bear or a panther was occasionally, but very rarely, seen. They have long since entirely disappeared. The common wild cat and large gray wolf are among the most rare animals. Even the small prairie wolf, which was formerly so common, is now fast disappearing.

178. **Birds,** of those kinds which are common in all the northern states, are plentiful in Iowa. Besides these there are a few peculiar and rare visitors. The raven is occasionally seen in the northern,

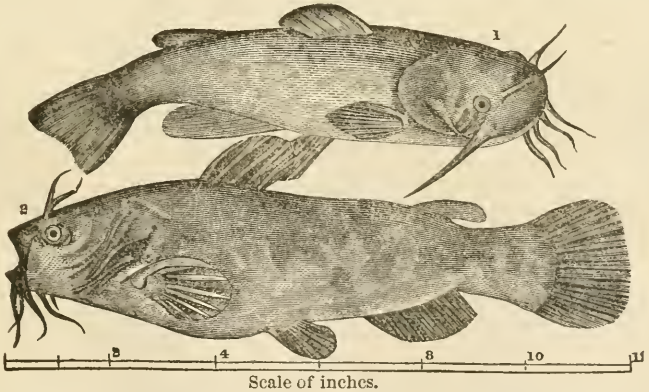
and the yellow-headed blackbird in the north-western, part of the state. The parroquet, a bird much like a parrot, has been occasionally found in the southern tier of counties.

179. **Game Birds.**—Wild turkeys and partridges, or ruffed grouse, are occasionally found in the wooded districts. Prairie chickens are abundant upon the prairies, but they are disappearing from those regions in which the prairies are all cultivated. Quails are common. Snipes, woodcocks, and a few curlews are to be found, in their season. Geese, swans, and ducks are abundant, during both their spring and autumn migrations, and a few of all of them breed in the unsettled portions of northern Iowa.



Scale of inches.

1. White Fish of the Lakes.—2. Salmon.—3. Brook Trout.—4. Troutlet.—5. Great Lake Trout of Europe. These belong to the *Salmon Family*.



Scale of inches.

1. Brown Cat-Fish.—2. Common Cat-Fish, or Horned Pout.

180. **Fish.**—The rivers of Iowa contain many kinds of fish, a good part of which are excellent for food. The markets of the cities situated upon the great rivers are regularly supplied with them. There are no fisheries in Iowa for preserving and exporting fish, such as exist upon the lakes and sea coasts.

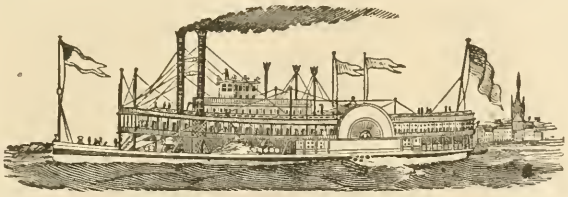
CHAPTER XII.

MISCELLANEOUS RESOURCES.

181. **Manufactures.** — The article most commonly and extensively manufactured in Iowa is *flour*, a great part of which is exported. Flour mills are so numerous in the state that one may be found within convenient distance of almost every farmer. Other manufactures are woolen goods, farm and mill machinery, wagons, linseed oil, hard wood lumber, paper, leather, and pottery.

Congress made a large donation of land for the purpose, and the work was commenced. Dams were built across the river, to raise the water so that boats might run, even in unusually dry seasons, and locks, like canal locks, were made at one end of each dam, through which boats might pass above and below. The plan failed, so far as navigation is concerned, but some of the dams remain

182. **Navigation.** — The Mississippi and Missouri are the only rivers of Iowa that are practically navigable. Small steamboats formerly navigated the Des Moines, Cedar, and Iowa rivers, but they have entirely ceased to do so. Before railroads were built, a plan was formed to make the Des Moines navigable as far, at least, as the present city of Des Moines, by a system of slack-water navigation. and are now used as mill-dams. The commerce of the Mississippi and Missouri is very great, and extends through about eight months of each year. It is carried on entirely by steamboats, except the lumber trade from the pine regions of Wisconsin. The lumber and logs are floated down the Mississippi in great rafts, upon which the workmen live until the raft reaches the place where it is to be



taken out for sale. Many of the steamboats are beautiful structures, and afford delightful means of travel.

183. **Water Power.** — Although the general slope of the state is so slight, yet there is fall enough at intervals, in nearly all the streams, to afford good water power. In some of the rivers, as, for example, the Des Moines, Iowa, Cedar, Wapsipinicon, and others the water power is very great.

184. **Water** is abundant and excellent in all parts of the state. Rills and small upper branches of the rivers are numerous, and springs are common, so that farm animals are naturally well supplied. Good wells may be dug almost anywhere. Upon the prairies water is usually found at from fifteen to thirty feet from the surface. Spring and well water is always "hard," that is, it contains carbonate of lime in solution, consequently it is not well suited for washing purposes. Rains are frequent and seasonable, so that cisterns for washing water are fully supplied. Many families, especially in the towns and cities, use the cistern water for all purposes, and prefer it to any other.

185. **Artesian Wells** have been bored with success at several places in Iowa. The one at the Hospital for the Insane, at Mt. Pleasant, is 1125 feet deep. In that well the water rose only to within thirty feet of the surface, but it overflowed freely from those at Keokuk, Farmington, and other places. Artesian wells probably cannot be obtained by boring at every place in the state, but many may no doubt be successfully bored at different places. These wells consist of only a hole, five or six inches in diameter, drilled down into the ground and the underlying rocks. Then an iron tube in joints, like large gas pipe, is dropped down, so as to bring the water from the bottom of the hole. The water that falls upon the surface at long distances away soaks down into the ground, and by its weight finds its way between strata, and under those that will not allow it to pass up through them until they are pierced by the drill. Then the pressure of the accumlated water forces a part of it up constantly through the hole to the surface.

186. **Fuel.**—The immense quantities of coal (see paragraph 132), the peat (see paragraph 81), and the forest trees (see paragraph 152), all show that Iowa is abundantly supplied with fuel. It is true that in some parts of the state fuel is now scarce, but it may be grown quickly and abundantly from the soil (see paragraph 170). By means of the numerous rail-

roads, also, the abundance of fuel in one part may readily be made to supply the deficiency in another. Besides all this, forest trees naturally encroach upon the prairies as soon as the fires are made to cease. In consequence of this, and of the artificial planting of trees, there is doubtless more wood fuel now growing in Iowa than was growing in it when it first began to be settled.

187. **Building and Fence Materials,** —Stone, brick clay, and lime have been mentioned in Chapter VIII. Considerable quantities of lumber for buildings and fences are made from the hard-wood trees of the state, but the greater part of lumber used in Iowa comes from the pine region of Wisconsin. It is floated down the Mississippi in large rafts, and then carried out into the state by railroads. The oak trees furnish good materials for fence posts and rails. Hedges are mentioned in paragraph 171.

188. **Road Materials.** — In many parts of Iowa, especially the four northern counties that border upon the Mississippi, stone suitable for road purposes is abundant. In many places gravel may be obtained from the river beds, but the roads of a large part of the state must always be upon the soil alone.

CHAPTER XIII.

CLIMATE.

189. **The Climate Uniform.** — The surface of the state is so uniform that there is no greater variety of climate in its different parts than is caused by the difference of latitude between the northern and southern boundaries, and by the difference in elevation of its surface. The growing season of vegetation begins about ten days earlier upon the southern, than it does upon the northern, state boundary. As far as comfort, convenience, and the growing of crops are concerned, the difference of climate in different parts of the state is hardly to be noticed by the inhabitants.

190. **Rain and Snow.*** — It was formerly thought that much less rain falls in Iowa than falls in the same latitude upon the Atlantic coast. Scientific observation, by use of properly constructed apparatus, continued through many years, shows that the difference is not great. Measuring each fall of rain and snow in the apparatus, reducing the snow to water also, the annual fall in Iowa is found to average about forty-two inches.

*The greater part of this chapter is taken from observations made by Prof. T. S. Parvin, Dr. Asa Horr, and Mr. Frank McClintock.

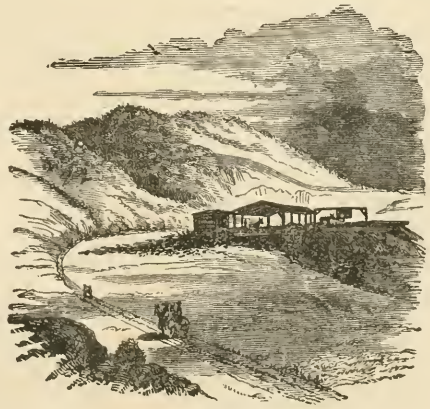
On the Atlantic coast, in the same latitude, it is about forty-five inches. Less *snow* falls in Iowa than upon the New England coast, but there is usually several weeks of sleighing here every winter.

191. **Freezing of the Rivers.**—Both the Mississippi and Missouri usually freeze over opposite Iowa every winter and remain frozen from two to three months. During the last thirty years there have been but two winters in which the Mississippi did not freeze entirely over, and in these winters it remained open only below the upper rapids. All the smaller rivers freeze over every winter.

192. **Temperature.**—Observations made at Muscatine and Iowa City during the thirty-two years ending with 1870, show that the greatest summer heat occurred in July, 1870, when it reached 100 degrees above zero (Fahrenheit). The greatest winter cold occured in January, 1857, when the thermoneter stood at 30 degrees below zero, but these are great extremes. The mean average temperature for each month of the year extending over the whole thirty-two years is as follows, the figures showing the number of degrees above zero:—January 20°, February 25°, March 35°, April 49°, May 59°, June 68°, July 73°, August 71°, September 63°, October 50°, November 26°, December 24°. The average annual temperature for the whole thirty-two years is 48° above zero.

193. **Flowering time of Fruit trees.**—The average time of the appearance of the first apple flowers at Muscatine is May 6th. The average time of their first appearance at Dubuque is May 12th.

194. **Health.**—As regards healthfulness, Iowa ranked as only third among the states of the Union in 1850. The diseases peculiar to newly settled regions have since largely disappeared, so that no state is now superior to Iowa in healthfulness.



QUESTIONS TO PART I.

CHAPTER I.

1. Compare Iowa with some other parts of the earth.
2. Where is the highest land between the Mississippi River and the Arctic Ocean?
3. How high is it above the level of the sea?
4. Explain the general features of North America.
5. What is the position of Iowa upon the continent?

CHAPTER II.

1. Give the boundaries of Iowa.
2. What is its greatest width? Its greatest length?
3. Give the number of square miles. Number of acres.
4. What are *natural* boundaries? Artificial boundaries?
5. Why are boundaries more irregular in some of the older States than in Iowa?
6. What is the name of the system of land surveys in use in Iowa?
7. How was all the land of Iowa first owned?
8. By what authority were the surveys made?
9. How were the surveys begun?
10. Name the two kinds of primary lines.
11. What is the use of principal meridians?
12. What is the use of base lines?
13. What principal meridian is used in Iowa?
14. In what part of the State is it?
15. Where does it start from, and end? Its course?
16. Where is the base line from which the Iowa surveys are measured?
17. Where does it start from? Its course?
18. Where do the base line and fifth principal meridian intersect?
19. What is the size of a congressional township?
20. Why are they called *congressional* townships?
21. How are townships numbered?
22. What is the number of the northern tier of townships in Iowa?
23. In what township is the city of Keokuk?
24. How are the ranges numbered?
25. Give some examples in Iowa.
26. How may these numbers serve as guides to localities?
27. What are correction lines? Why are they necessary?
28. Give the location of the correction lines in Iowa.
29. How are townships divided?
30. How are the sections numbered?
31. How are sections divided, and their parts designated?
32. Give some example of description of land by the use of the land survey system.
33. What is a "sectional map?" A "township map?"
34. How are the township and range numbers placed on maps?

CHAPTER III.

1. What is meant by the general level of the State?
2. How have the valleys been formed?
3. What distinction is made between "valley-sides" and "hill-sides?"
4. What is meant by "drainage slope?"
5. What is a water-shed?
6. Give the position of the Great Water-shed of Iowa.
7. What are secondary water-sheds?
8. Is the Great Water-shed the highest land between the two great rivers, throughout its whole length?
9. What is the average height of Iowa above the sea?
10. Give the height of the four corners of the State.
11. Give the height of the highest land in Iowa. Where is it?
12. Give the height of the highest land upon the southern boundary of the State. In what county is it?
13. Give the height of the lowest land in Iowa. Where is it?

14. Give the slopes, per mile, upon the northern boundary.
15. Give the slopes, per mile, upon the southern boundary.
16. Give the slopes, per mile, of the eastern and western sides of the State.
17. Give the slope from the highest to the lowest land in the State.
18. What is the rate of the steepest of these slopes, in feet and inches?
19. Describe the prairies. What are rolling prairies?
20. Will trees grow upon the prairies, if planted?
21. What has prevented their natural growth there?
22. Are the prairies increasing or growing less?

CHAPTER IV.

1. What is the origin of the names of the rivers?
2. Is the river water usually clear, or otherwise?
3. Describe the general character of the river valleys.
4. What are the bluffs?
5. Describe the bluffs of the Mississippi.
6. Describe the Mississippi bottom.
7. Give the slope of the Mississippi from the northeast to the southeast corner of the state.
8. How much does it differ from the slope between those two points in a straight line?
9. What are the Rapids of the Mississippi?
10. Give their locations and names.
11. Give the length of the Upper Rapids. The slope, in feet.
12. Give the length of the Lower Rapids. The slope, in feet.
13. Describe the bluffs of the Missouri River.
14. Describe the Missouri bottom.
15. Give the slope of the Missouri along the Iowa border.
16. Are the river valleys of Iowa very different from each other?
17. Give some account of the valleys of the Upper Iowa, Turkey, Maquoketa, and Wapsepinecon, Iowa and Cedar, Skunk and Des Moines rivers.
18. Are the valley-sides very rocky?
19. Have those of Western Iowa as much rock as those of Eastern Iowa?
20. Give some description of the valleys of Chariton, Grand, and Nodaway Rivers.
21. Give some description of the valleys of Nishnabotany, Little Sioux, and Big Sioux Rivers.

CHAPTER V.

1. Describe the bottom lakes. How were they formed?
2. Describe the upland lakes.
3. Describe and give location of Spirit, Okoboji, Clear, and Storm Lakes.
4. Explain the origin of the so-called walls of some lakes.
5. What is peat? How is it formed?
6. Describe the pond-marshes. The spring-marshes.
7. In what parts of Iowa is peat found?
8. Is it found mostly in pond or in spring marshes?
9. How is peat prepared and used for fuel?

CHAPTER VI.

1. Define Geology.
2. What different kinds of rocks is the earth's crust composed of?
3. What are stratified? How were they formed?
4. What are fossils? Where are they found?
5. How is it that stratified rocks are now found above the sea?
6. How is earth-history taught by the elevation of rocks?
7. How is earth-history taught by fossils?
8. What are the branches of Geology? Define them.
9. How is geological time studied, by years?
10. Name, in their order, the geological ages.
11. Give the distinguishing characteristics of each age.
12. Give the names of the divisions of strata.
13. Describe the Glacial epoch.
14. What is the drift?
15. What is the origin of rock material?

CHAPTER VII.

1. Are rocks much exposed to view in Iowa?
2. In what part of the state are they most plentifully seen?
3. Give the names of the formations of the state, beginning with the oldest.
4. Give the name of each group with the formations belonging to it.
5. Name the systems in their order, with the groups belonging to each.
6. Explain the geological structure of the state by use of the geological map.
7. Give the character of each of the Iowa formations in their order.
8. Describe the character of the drift in Iowa.
9. What are boulders? What kinds of rock are they composed of?
10. What are drift scratches? How were they made?
11. What other objects are found in the drift?
12. What is the bluff deposit? Where is it found?
13. What are its peculiarities? Its origin?
14. What is alluvium? Where found?

CHAPTER VIII.

1. What is meant by the coal-field?
2. How many square miles in the Iowa coal-field?
3. How is coal found?
4. What is the position of coal-beds in Iowa?
5. How is coal mined?
6. How do the miners work?
7. What kind of coal is found in Iowa?
8. What kinds of metals are found in the state?
9. Where is lead mined?
10. How is it found?
11. How is it smelted and prepared for the market?
12. Where is gypsum found? Describe the quarries.
13. What is "plaster?" Its use?
14. What is plaster of paris? Its use?
15. What use is made of gypsum at Fort Dodge?
16. In what parts of Iowa is stone most plentiful? Least?
17. In what parts of Iowa may lime be made? What from?
18. Where is brick clay found? Where potters' clay?
19. Where may sand be obtained?

CHAPTERS IX. & X.

1. What is the quality of Iowa soil?
2. What portion of the surface of the state is tillable?
3. What is meant by drift soil, bluff soil, and alluvial soil?
4. Is there great diversity of vegetation in different parts of Iowa?
5. Why is the vegetation probably so uniform?
6. Name the most common kind of forest trees.
7. Name those less common.
8. What trees, common in eastern states, do not grow naturally in Iowa?
9. What kinds of native fruits grow in Iowa?
10. What kinds of nuts?
11. Is the wild hay of the prairies of much value?
12. Where does wild rice grow? Is it of much value?
13. Name the different kinds of field productions.
14. What kinds of garden vegetables may be cultivated?
15. What kinds of fruit may be grown successfully?
16. Will forest trees grow successfully when planted or transplanted upon the prairies?
17. Have hedges proved successful?
18. What kind of shrubs are used for hedges?

CHAPTER XI.

1. Name the different kinds of domestic animals.
2. Name the different kinds of domestic birds.
3. What products for export and use do each afford?

4. Are there many wild animals and birds in Iowa?
5. What animals were formerly abundant, but now gone, or nearly so?
6. Is the deer still found?
7. What fur animals are still found in the State?
8. What ferocious animals were formerly, or now, found in the State?
9. What rare birds are found in the State?
10. Name the game birds of the State.
11. Are fish abundant in the rivers and lakes?

CHAPTER XII.

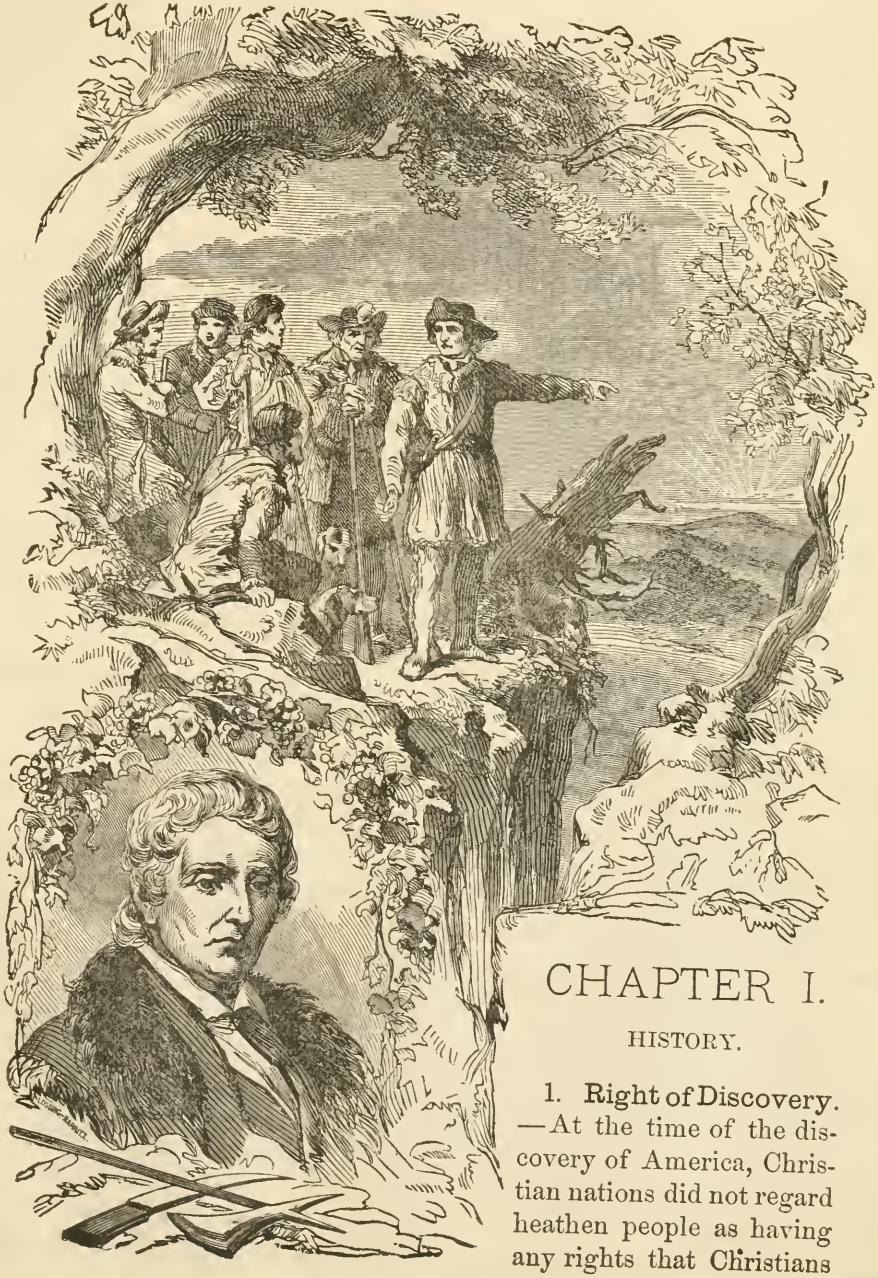
1. What kinds of manufacturing are done in the State?
2. Is water-power abundant? Where?
3. What streams are navigable?
4. What plan was formerly tried for navigating the Des Moines?
5. Is water plentiful in all parts of Iowa, and easily obtained?
6. How deep, usually, must the wells be dug?
7. Describe artesian wells. Why does the water rise?
8. Is fuel plentiful in all parts of the state?
9. Name the different kinds of fuel.
10. Are building and fence materials abundant?
11. Where is pine lumber mostly obtained?
12. How is it brought down the Mississippi?
13. Is road material abundant in all parts of Iowa

CAAPTER XIII.

1. Is the climate uniform in all parts of the State?
2. What is the difference in the growing season between the northern and southern parts of the State?
3. Does this difference much affect the crops or the inhabitants?
4. How much rain falls annually in Iowa? How much on the Atlantic coast?
5. Does more snow fall here, or there?
6. Do the rivers of Iowa freeze over every winter?
7. What is the highest recorded degree of summer heat? When did it occur?
8. What is the lowest recorded degree of winter cold? When did it occur?
9. What is the mean average temperature for each month in the year?
10. What is the average time of the flowering of apple trees in Dubuque and Muscatine?
11. What can you say as to the healthfulness of Iowa?

PART II.

INSTITUTIONS.



CHAPTER I.

HISTORY.

1. Right of Discovery.—At the time of the discovery of America, Christian nations did not regard heathen people as having any rights that Christians

were bound to respect. Christian explorers took possession of heathen countries, when they discovered them, without permission of the inhabitants, believing it right not only to do so, but to make war upon them if they resisted. In this way several of the nations of Europe laid claim to different portions of America, and called it theirs "by right of discovery."

2. **Claims of France and Spain.** — France claimed that portion of North America which now includes Iowa, in consequence of its discovery by Marquette* in 1673. In 1763, France, by treaty, transferred her claim to Spain. Spain, by treaty, first in 1800, and confirmed in 1801, ceded it back to France. Both of these transfers were made without any reference to the rights of the Indians who occupied the country.

3. **The Louisiana Purchase.** — By a treaty with France, made in April, 1803, the United States bought for fifteen millions of dollars† all the vast region Spain had ceded back to France in 1801. This transaction was called the "Louisiana Purchase," because the whole territory thus bought was at that time called Louisiana. It included all the country now owned by the United States west of the Mississippi, except Texas and the territory since obtained from Mexico. It was the first territory the United States owned west of the Mississippi. In this sale also no reference was had to any right of the Indians to the land.

4. **Purchases from the Indians.** — Notwithstanding the example of other nations, and although the United States had paid France so large a sum of money for that territory, they have always regarded the Indians as the rightful owners of the land, consequently they have, from time to time, as more land was needed for settlement, held treaties with the different tribes of Indians and purchased it a second time from them.

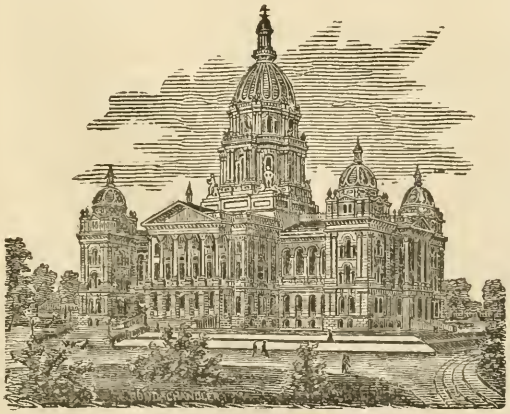
5. **Territorial Governments.** — It would require too much space to give the history of the different territories of which the region now called Iowa has at various times formed a part. The following, however, is a statement of the names of the different territorial governments that have had jurisdiction over it from the time of the Louisiana purchase until its admission into the Union :—

In 1804 the Louisiana purchase was divided into Orleans Territory and Louisiana District. The latter, which included what is now the state of Iowa, was placed under the jurisdiction of Indiana territory. In 1805 Louisiana district was made Louisiana territory, with a territorial government of its own. In 1812 a *state* having

* Marquette, in company with Joliet, went from Quebec by way of the great lakes to Green Bay, thence across to the Wisconsin and down that river to the Mississippi. They were the first white men to see the land of Iowa. Their first view of it was from the mouth of the Wisconsin, nearly opposite McGregor.

† Some authors say the sum was not so large.

been admitted into the Union with the name of Louisiana, the name of the *territory* of Louisiana was changed to that of Missouri. In 1834 all the territory of the United States west of the Mississippi and north of the state of Missouri (of course including Iowa) was placed under the jurisdiction of the territory of Michigan. In 1836 the territory of Wisconsin was separated from the territory of Michigan. Iowa was then known as the Iowa district of Wisconsin territory, and the seat of government for the whole territory was at Burlington. In 1838 Iowa district received a separate territorial government, and Burlington remained the capital, not now of Wisconsin, but of Iowa territory. In 1839 the capital was removed from Burlington to Iowa City. On December 28th, 1846, Iowa was admitted into the Union as a state, with its boundaries fixed as described in the next chapter. In 1857 the



NEW CAPITOL BUILDING.

capital was removed from Iowa City to Des Moines, where it now remains.

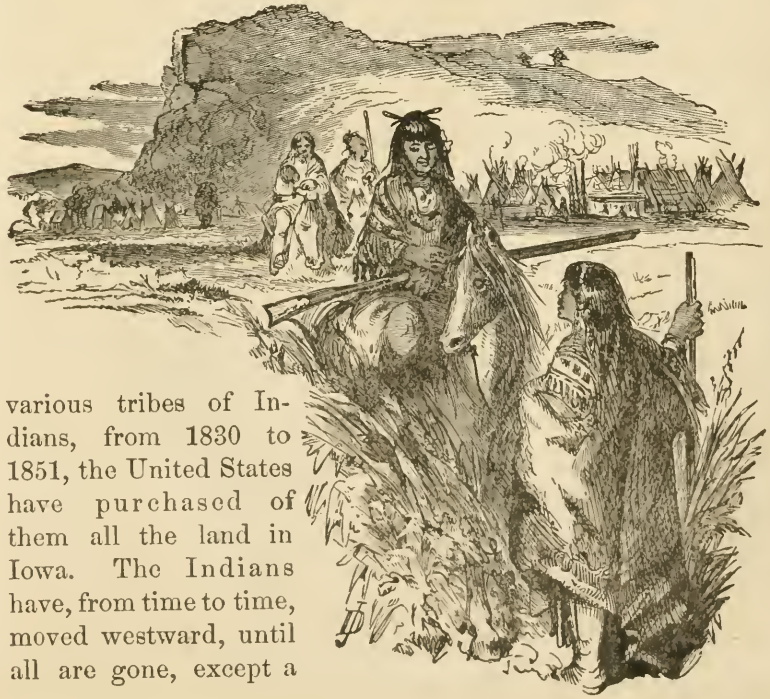
6. **Ancient Aborigines.** — Remains of the work of human hands, which must necessarily be very ancient, are found in different parts of North America. In Iowa such remains consist principally of mounds of earth, and are often found crowning the river bluffs and elsewhere. The mounds are usually circular in form, from fifteen to thirty feet in diameter, and from two to eight feet in height. Some of them were used as places for the burial of the dead, and some were not. No information concerning their origin could ever be obtained from Indians, nor from any other source. They are, no doubt, the work of an ancient people, long since passed away.

7. ***Indians of Iowa.** — At the time of the Louisiana purchase the territory

*The facts concerning the Indians of Iowa are from an unpublished history by Hon. Chas. Negus.

now embraced within the limits of Iowa was in possession of the Sioux, Sac, Fox, and Iowa tribes of Indians. How long they had occupied it, and what tribes had occupied it before them, is not known. The three last named tribes were joined in a confederation and occupied the southern portion, as well as a large part of Missouri and Illinois. The Sioux occupied the northern portion, and also a large region adjoining it on the north and west. The Omaha, Ottoe, and Missouri tribes lived in what is now Nebraska, but claimed a part of western Iowa as hunting ground.

8. **Treaties and Purchases.**—At five or six different treaties held with the various tribes of Indians, from 1830 to 1851, the United States have purchased of them all the land in Iowa. The Indians have, from time to time, moved westward, until all are gone, except a small company of Sacs and Foxes that now live in Tama county.



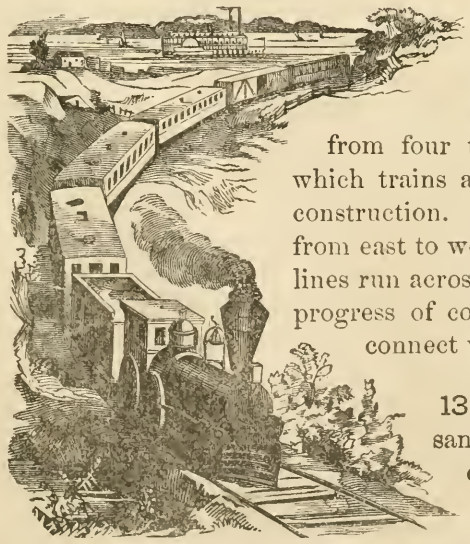
9. **Early Settlements.**—Some French pioneers and American hunters had long lived among the Indians, by their permission, but the whites were first permitted by the government to settle in Iowa, in June, 1833. The Blackhawk war had closed the autumn before. The part of Iowa first opened to settlement was called the "Blackhawk Purchase." This purchase embraced the country from the northern boundary of Missouri to within twenty miles of the Upper Iowa river. It was from forty to fifty miles wide, the Mississippi being its eastern border. A few Frenchmen had settled at Montrose, and also at Dubuque, before the close of the last century, but the first settlements by Americans in Iowa were made at Fort Madison, Burlington, and Dubuque. The counties of Des Moines and Dubuque were the first organized.

10. **Increase of Population.**—That the population of Iowa has rapidly increased since its admission as a state, is shown by the following table:—

In 1846 the pop. was				97,588
" 1850	"	"	"	191,982
" 1860	"	"	"	674,913
" 1870	"	"	"	1,191,792

11. Post Offices.—From 1833 to 1870 there have been nearly six hundred post offices established in Iowa. All post offices are established and maintained by the United States government, and all postmasters are appointed by the President of the United States.

12. Railroads.—The first train of cars in Iowa was run from Davenport, in 1855, upon what is now called the Chicago, Rock Island & Pacific Railroad. From that time until the present the building of railroads has progressed rapidly. There are now not far from four thousand miles of railroads in the state, upon which trains are running, and much more is in process of construction. Four lines now run entirely across the state, from east to west, and another is soon to be completed. Three lines run across it from north to south, and two others are in progress of construction. The other lines are shorter, and connect with the principal lines.



13. Soldiers.—Iowa furnished eighty-three thousand soldiers to the armies of the Union in the war of the great rebellion. In all those armies none were braver or better than Iowa soldiers.

CHAPTER II.

STATE GOVERNMENT.

Section 1. *The General Government.*

14. **The Supreme Law of the Nation.** — The constitution of the United States, the laws of congress made in accordance with that constitution, and all treaties made by authority of the United States, together constitute the supreme law of the nation. No state can form a constitution for itself, nor enact any valid law at variance with this supreme law.

15. **The United States Government.** — A brief outline of the United States government is given here because of its intimate relation to the state governments, and because both are constructed upon a similar plan. The United States government consists of three *branches*, namely,— the *legislative*, *executive*, *and judicial.*

16. **The Legislative Branch** consists of the two houses of congress, namely,— the senate and the house of representatives. The *senate* is composed of two senators from each state, whether the state be large or small, or whether it has many or few inhabitants. The *house of representatives* consists of members elected by the people of each state. The number of representatives in congress each state is entitled to depends upon the number of its inhabitants. But each state is entitled to at least one representative without regard to the number of its inhabitants.

17. **The Executive Branch** of the United States government is vested in the President of the United States, who is elected by the people, and holds his office four years.

18. **The Judicial Branch** is vested in the judges of the supreme court of the United States, who are appointed by the United States senate, and hold their office during good behavior.

Section 2. *The State Government.*

19. **The Constitution.** — A constitution is the fundamental law of the state, prescribing the power of the departments of its government, and securing the rights and explaining the duties of its citizens. The constitution of a state is the supreme law of that state, so far as its own citizens are concerned, and no legislature can enact any valid law at variance with it. Before the application of a state to be admitted into the Union can be made, the people must form a constitution and present it to congress for approval. It must be approved by congress before the state can be admitted. A state may at any time afterward, by a proper vote of the people, amend its constitution or make a new one.

20. **State Constitution of Iowa.** — The constitution which was adopted when

Iowa became a state, is known as the "old constitution," because in 1857 it was changed for another, known as the "new constitution." The latter is now in force, except that in 1868 the word "white" was stricken out, by vote of the people, so that colored persons should have the same privileges and responsibilities as white people, which before were not granted them.

21. **Bill of Rights.** — The first article of the constitution is called the bill of rights. It is a statement of the natural and inalienable rights of man, among which are,—political power, freedom from religious control, uniformity of law to all, liberty of speech and of the press, personal security, trial by jury, freedom from official arrest and imprisonment without showing due cause,* subordination of the military to the civil power, protection of property, etc.

22. **The Right of Suffrage.** — The second article of the constitution provides that "every male citizen of the United States, of the age of twenty-one years, who shall have been a resident of this state six months, next preceding the election, and of the county in which he claims his vote sixty days, shall be entitled to vote at all elections which are now or hereafter may be authorized by law. All elections by the people shall be by ballot."

23. **Departments of the State Government.** — The *departments* of the state government of Iowa correspond to what are termed *branches* of the United States government, in paragraph fifteen. The constitution provides that "the powers of the government of Iowa shall be divided into three separate departments,—the *legislative*, *executive*, and *judicial*."

Section 3. *The Legislative Department.*

24. **Powers.** — To the legislative department belongs the making of all the laws of the state, and also the power to repeal laws, all with the restrictions mentioned in paragraph 14. The legislative department is vested in the—

25. **General Assembly.** — This consists of a senate and house of representatives, and meets in regular session at the capitol, in the city of Des Moines, every second year, in January. The senate shall consist of not more than fifty senators. The house of representatives shall consist of not more than one hundred members.

26. **Districts.** — For the purpose of electing members of the general assembly, or, as it is usually called, the legislature, the state is divided into senatorial and representative districts. In many cases a district consists of a single county, but several of the less thickly populated counties together sometimes form a district. The limits of these districts may be changed by any general assembly.

27. **The Senate.**—Senators are elected for four years, by the people of each senatorial district, and serve in two regular sessions. No one can be elected senator

* That is, the right of *habeas corpus*.

until he is twenty-five years old, and has the qualifications required of voters, as shown in paragraph 22. The presiding officer of the senate is the lieutenant governor.

28. **House of Representatives.** — Representatives are elected for two years, and serve in one regular session. They must be twenty-one years old, and have the required qualifications of voters, as shown in paragraph 22. The members of the house of representatives elect one of their number "speaker," who is their presiding officer.

29. **Law Making.** — A *bill* is a written draft of a desired law, and may be presented first in either the senate or house of representatives. A bill becomes a law when it is passed and approved. To pass a bill it must receive a *majority* of the votes of all the members elected to the general assembly, first in one house and then in the other. When a bill is passed it is sent to the governor for his approval. If he approves it he signs his name to it and it becomes a law. If he does not approve it he vetoes it, that is, he sends it back to the general assembly with a statement of his objections. If both houses then pass the bill again by a *two-thirds* vote in each, it becomes a law without the governor's approval. If it does not receive two-thirds of the votes in both houses, it fails to become a law. All new laws take effect on the 4th of July after their passage, unless otherwise provided.

Section 4. *The Executive Department.*

30. **The Governor.** — The supreme executive power is vested in the governor, who is elected by the people of the whole state, at the general election, and holds his office two years. His term of office begins on the second Monday of January next after his election. No person shall be eligible to the office of governor who shall not have been a citizen of the United States, and a resident of the state two years next preceding the election, and attained the age of thirty years at the time of the election. The governor is commander-in-chief of the militia, army, and navy of the state. He shall see that the laws are faithfully executed. He shall fill vacancies in office, when they occur, by appointment, in case the law does not otherwise provide for filling them. He may, on extraordinary occasions, convene the general assembly in extra session. He keeps the great seal of the state. He shall communicate, by message, to the general assembly, at every regular session, the condition of the state, and recommend such matters as he shall deem expedient. He may pardon any person convicted in the courts of any crime, except treason, and in cases of impeachment, or he may change the character of the punishment inflicted by the courts to a milder one.

31. **The Lieutenant Governor.**—The manner of election, eligibility, and term of office is the same for lieutenant governor as for governor. The lieutenant governor is president of the senate. In

case the governor should die, or otherwise vacate his office, the lieutenant governor becomes governor, and the senate elect a president in his place from among themselves.

32. **Other State Officers.** — A secretary of state, auditor of state, treasurer of state, superintendent of public instruction, and register of the state land office are elected by the people of the state every two years, at the general election.

33. **The Secretary of State** has charge of the official papers of the state. He countersigns all commissions issued by the governor, certifies to all laws and resolutions passed by the general assembly, and performs various other duties.

34. **The Auditor of State** is its business officer. He keeps all its accounts, and settles accounts between the state and its public officers. Also between the state and the United States, and between this state and other states.

35. **The Treasurer of State.** — It is the duty of the treasurer of state to take charge of, and safely keep, for the use of the state, all its moneys, and to pay them out as provided for by law.

36. **The Superintendent of Public Instruction** (see paragraph 108).

37. **The Register of the State Land Office** has charge of all the lands belonging to the state. When they are sold, the title issues from his office to the purchaser.

Section 5. The Judicial Department.

38. **Composition and Officers.** — The judicial department comprises a *supreme court*, *district court*, and *circuit court*. Its officers are judges of the supreme court, clerk of the supreme court, reporter of the supreme court, attorney general, district and circuit judges, and district attorneys,—all of whom are elected by the people at the general election.

39. **The Supreme Court** consists of four judges. Their term of office is six years. They are so classified that each judge in succession becomes chief justice before his term expires. Besides the performance of other functions, the supreme court constitutes a court for the correction of errors at law, and also exercises supervisory control over all inferior courts throughout the state. If a party to a suit in either the circuit or district court should not be satisfied with the decision given there, appeal may be made to the supreme court.

40. **The Reporter and Clerk of the Supreme Court.** — The reporter reports and publishes in book form all the decisions of the supreme court, that they may be used as guides in the inferior courts when they have similar causes before them. The clerk of the supreme court records all its judgments and proceedings. The term of office for both is four years.

41. **The Attorney General** is elected for two years. It is his duty to be

present at the sessions of the supreme court, to be the attorney for the state in all cases when its interests are involved, and to be the adviser and counsellor of the general assembly, all the officers of state, and of the district attorneys.

42. **Judicial Districts.** — The state is now divided into fourteen judicial districts, but the number may be increased when necessary. The people of these districts, every four years, at the general election, choose one judge of the district court, one judge of the circuit court, and one district attorney.

43. **The District and Circuit Judges** each hold their courts at stated, but different times, at the county seat of every county in their district. Both judges have jurisdiction in the same kinds of causes, except probate and criminal causes. Probate causes come only before the circuit court, and criminal causes come only before the district court.

44. **District Attorney.** — It is the duty of the district attorney to conduct the prosecution of all persons in his district accused of crime against the laws of the state. He must also act as the adviser and counsellor of the county officers of each county in his district. His relation to the district court and the county officers is somewhat similar to the relation of the attorney general to the supreme court and state officers.

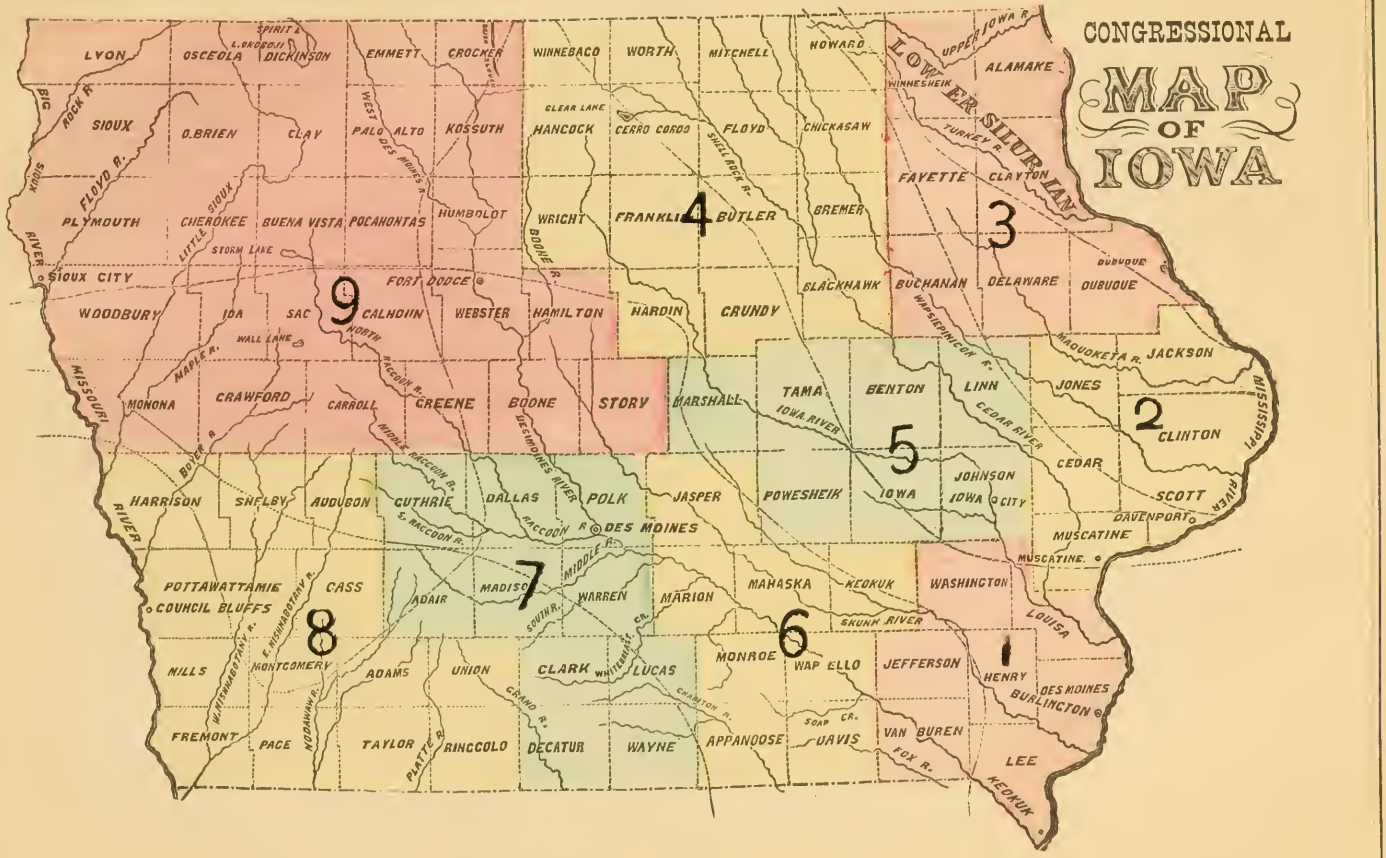
Section 6. *Miscellaneous.*

45. **United States Senators** are elected by a majority of the votes of the two houses of the general assembly in joint session. Their term of office is six years.

46. **Representatives in Congress** are elected by the people at the general election. Their term of office is two years. The state is divided into as many districts as the number of representatives it is entitled to in congress. These are called congressional districts, and the people of each elect one representative. Each district contains as nearly as practicable the same number of inhabitants, but they vary greatly in size.

47. **Districts.** — It has been shown that the state is divided into districts of various kinds, namely,— senatorial, representative, judicial, and congressional. All are liable to have their boundaries changed, as the increasing population and wants of the people require.

48. **Militia.** — The law provides that all male persons between the ages of eighteen and forty-five years, except such as are exempt by the laws of the United States, shall be enrolled as the militia of the state. When war does occur there are so many ready to volunteer that the militia of Iowa has never been called upon for soldiers, except in the time of the great rebellion. The religious opinions of some persons make them unwilling to go to war. The law will not compel such a person to go, but, if called upon, he must pay a sum equal to that which is paid to one who does go.


CONGRESSIONAL
MAP
OF
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EMMETT
CROCKER
WINNEBAGO
WORTH
MITCHELL
HOWARD
ALAMAKE
SIOUX
O'BRIEN
CLAY
PALO ALTO
KOSSUTH
HANCOCK
CERRO GORDO
FLOYD
CHICKASAW
FAYETTE
CLAYTON
PLYMOUTH
CHEROKEE
BUENA VISTA
POCAHONTAS
HUMBOLDT
WRIGHT
FRANKLIN
BUTLER
BREMER
SIOUX CITY
FORT DODGE
BLACKHAWK
BUCHANAN
DELAWARE
DUBUQUE
WOODBURY
IDA
SAC
CALHOUN
WEBSTER
HAMILTON
HARDIN
GRUNDY
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
STORY
MARSHALL
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BENTON
LINN
JONES
CLINTON
HARRISON
SHELBY
AUDUBON
GUTHRIE
DALLAS
POLK
JASPER
POWESHEIK
IOWA
JOHNSON
CEDAR
SCOTT
DES MOINES
DAVENPORT
MUSCATINE
POTTAWATTAMIE
COUNCIL BLUFFS
CASS
ADAIR
MADISON
WARREN
MARION
MAHASKA
KEOKUK
WASHINGTON
LOUISA
NILLS
MONTGOMERY
ADAMS
UNION
CLARK
LUCAS
MONROE
WAPELLO
JEFFERSON
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CHAPTER III.

COUNTIES AND TOWNSHIPS.

Section 1. *Counties.*

49. **Boundaries.**— The state is divided into ninety-nine counties, the boundaries and names of which have been fixed by law of the general assembly. Their boundaries usually follow township and range lines, except those that are also parts of the state boundary lines. This gives most of the counties a rectangular outline, as may be seen by a glance at a map of the state.

50. **County Seats.** — The people of each county select a place at which to transact its principal business. This is called the county seat, and is usually near the centre of the county. Here its offices are located, its records are kept, and its courts are held. The county usually owns a house called a court house, which contains rooms for its offices, safes for its records and money, and a large hall in which to hold its courts. It has a jail also in which to confine criminals.

51. **Poor House.** — It is the duty of the people to take care of the poor, and to see that none suffer for want of food and shelter, who are not able to provide for themselves. Each county must provide for its own poor. For this purpose it usually owns a poor house and farm, in some part of the county, to which the poor people are sent.

52. **County Officers.** — The county officers are all elected by the people at the general election, and hold their offices two years. The officers are,— three supervisors, one auditor, one clerk of the district and circuit courts, one sheriff, one treasurer, one recorder, one superintendent of schools, one coroner, and one surveyor. The number of supervisors may, in certain cases, be increased to five or seven. In no case shall two supervisors reside in the same township.

53. **The Board of Supervisors.** — The duties of the board of supervisors are numerous. They are the general business managers of the affairs of the county. They have control of its property, and authority in relation to the roads. They levy the state and county taxes. They examine and audit all accounts against the county. They grant ferry licenses and provide for the erection of bridges. They build and keep in repair the necessary buildings for the use of the county and the district and circuit courts.

54. **The Auditor** is required to act as clerk of the board of supervisors, to perform certain duties in relation to the school fund and school lands of the county, the establishment, change, and vacation of roads, and the transfer of records of deeds.

55. **Clerk of the District and Circuit Courts.** — The clerk of the district court is also clerk of the circuit court. These courts have a clerk for every county in their district, but he is numbered among the county officers. It is his duty to keep the records of the courts, and to have custody of their papers and seals.

56. **The Sheriff** is called the chief ministerial officer of the county. It is his duty to attend at every session of the district and circuit courts of his county. He makes arrests, serves writs and other legal processes. He has charge of the jail and of the prisoners in it. He also performs various other duties, in all of which he may have deputies and bailiffs to assist him.

57. **The Treasurer.** — It is the duty of the treasurer to collect all taxes at his office, to take charge of the money of the county, and pay it out as provided for by law.

58. **The Recorder.** — It is the duty of the recorder to write a full copy of every deed to land, and every similar writing which is made in the county, in books kept for that purpose. This is done for the purpose of preserving in a safe place the evidence of ownership of the people in their property, and to give public notice of such ownership.

59. **The Coroner.** — Should the office of sheriff become vacant, from any cause, the coroner must act as sheriff. In case a person is supposed to have died by unlawful means, it is the duty of the coroner to hold an inquest on the body, to ascertain the facts, if possible.

60. **Superintendent of Schools.** — (See paragraph 109).

61. **The Surveyor.** — It is the duty of the county surveyor to make all surveys of land within his county which he may be called upon to make.

63. **Notary Public.** — Notaries public are not properly county officers, yet the powers of each are limited to his own county. They are commissioned by the governor, and hold their office three years, unless sooner removed. There may be one or more in each county. A notary public may administer oaths, and take the acknowledgment of deeds. He also performs certain other duties pertaining to the custom and law of merchants and bankers. He must have a seal and use it upon the deeds and other writings of which he takes acknowledgment and proof.

Section 2. Townships.

63. **Civil Townships.** — Every county is divided into civil townships, each of which receives a name. They are of such size and shape as the people shall determine, and may be afterward changed or divided. Their boundaries often follow congressional township lines, and in many cases a civil township consists of one whole congressional township. *Civil townships* are formed as parts of the system of government. *Congressional townships* are

formed as a part of the system of land-surveys, established by congress.

64. **The Township Officers** are,—three trustees, one clerk, one assessor, two constables (or more if necessary), and two justices of the peace (or more if necessary). Also one road supervisor for each road district in the township. The term of office for each is one year, except that of justice of the peace, which is two years, and they are elected by the people at the general election.

65. **The Trustees** have the general management of affairs pertaining to the township. They are the judges of the general election. They order notices of election to be given, and fix the places of holding them. They are overseers of the poor, and fence viewers. They divide the township into suitable road districts.

66. **The Clerk** keeps a record of the proceedings and orders of the trustees. He also prepares and keeps a register of the qualified voters of his township, to be used at elections, and also serves as clerk at elections.

67. **Assessor.**—It is the duty of the assessor to make a list of every person in his township. He must also make out a list of all the property in his township that is liable to taxation. To this list he must affix the value of each piece of property, according to the best of his judgment, that it may be properly taxed.

68. **Constables.**—The duties of constables are not confined wholly to their townships, but they are, in part, county officers also. They are ministerial officers in the courts of justices of the peace, having a relation there somewhat similar to that of sheriffs in district and circuit courts. They serve writs and summonses, perform various duties as preservers of the peace, and attend upon the district and circuit courts as bailiffs at the request of the sheriff.

69. **Justices of the Peace.**—Although a justice of the peace is elected by the voters of his township only, he is in some respects a county officer also. Not only this, but he holds an important relation to the judicial department of the state. His duties are various. He holds court as judge in the trial of disturbers of the peace, in the preliminary trial of persons accused of crime, and in the collection of debts of less amount than one hundred dollars. He may perform the marriage ceremony, and take the acknowledgment of deeds. In the latter case he need not have a seal, such as the notary public is required to use.

70. **Road Supervisors** superintend the repairs of roads in their districts, and require every man between the ages of twenty-one and fifty years to work two days in each year on the roads, or pay the wages of another man to do it.

CHAPTER IV.

CITIES AND TOWNS.

71. **Municipal Government.** — Besides the division of the state into counties, and the counties into townships, each having their own peculiar organization and officers, as before described, there may also be incorporated cities and towns, each having a separate government, called a municipal government. The township government and officers are never superseded by municipal governments and their officers, but the former always exist just as if the latter did not. Neither do municipal governments supersede or interfere with the county government except so far as the control of roads, streets, ferries, and bridges is concerned. Incorporated towns and cities are laid off into lots, with streets at convenient distances. The extent of territory that each shall embrace is determined by the inhabitants.

72. **Cities** are divided into two classes according to the number of their inhabitants. Those of the first class must have at least fifteen thousand inhabitants, and those of the second class at least two thousand. Each city is divided into wards. Some of the older cities of Iowa were organized under "special charters" before the general law was passed, dividing them into classes.

73. **Cities of the First Class.**—The officers of a city of the first class are,— one mayor, a city council, consisting of two trustees from each ward, one marshal, one treasurer, one auditor, one solicitor, one police judge, and one superintendent of the market. The term of office for each is two years. Other officers may be elected, and many others are appointed by the council.

74. **The Mayor** is the chief officer of the city. He presides at the meetings of the council and is also a magistrate. His duties in the latter respect are much the same as those of a justice of the peace.

75. **The Council** pass laws, called ordinances, for the government of the city, levy taxes, appoint subordinate officers, &c.

76. **The Marshal** is the chief ministerial officer of the city. He attends upon the courts of the mayor and police judge. His other general duties are similar to those of constable.

77. **The Treasurer** has charge of all money belonging to the city, and pays it out according to the orders of the council.

78. **The Auditor** attends to the general financial business of the city.

79. **The Solicitor** must be a lawyer. He conducts such legal business for the city as it may require, and acts as adviser and counsellor of the city officers.

80. **Police Judge.**—The police judge is the principal magistrate of a city of the first class. The other official business of mayors of large cities is so great that the magisterial duties are usually performed by police judges. Their courts are called police courts. In addition to violations of the city ordinances they have jurisdiction in all causes, such as may be brought before a justice of the peace.

81. **The Superintendent of the Market** has charge of the buildings and places provided by the city for the sale of fresh meat and vegetables.

82. **Cities of the Second Class.** — The officers of a city of the second class are, a mayor, a city council, composed of two trustees from each ward, a treasurer, and a solicitor. Their terms of office are each one year, except that of solicitor, which is two years. Other officers are appointed by the city council. The duties of the officers of cities of the second class are the same as those of corresponding officers of cities of the first class.

83. **Incorporated Towns** may comprise any number of inhabitants up to two thousand, when they are entitled to become cities of the second class. Their organization is much like that of cities. The officers are, a mayor, a recorder, and five trustees, all of whom together form the council. The term of office for each is one year.

CHAPTER V.

ELECTIONS AND TAXES.

Section 1. *Elections.*

84. **Kinds of Elections.** — Elections are,— general, municipal, school, and special. The manner of holding elections is essentially the same in all cases, so that the general election only is described.

85. **The General Election** is held in autumn, in each township. The following officers are chosen at this election, but as the term of some of them is longer than that of others, all those named are not elected every autumn: Electors of the president and vice-president of the United States, representatives in congress, state senators and representatives, the governor, and all other state officers, judges of the supreme, district, and circuit courts, clerk of the supreme court, reporter of the supreme court, attorney general, district attorneys, and all county and township officers.

86. **Manner of Holding the General Election.** — The place or room in

which the election is held is called the poll. The persons who conduct the election are the judges and two clerks. The township trustees are the judges, and the township clerk is one of the clerks of the election. The township clerk has at the poll a register of the voters of the township, which has been previously prepared. They have also two other books in which to register the names of the persons voting. These are called the poll-books. Each voter must have the names of the persons whom he desires shall be elected to the different offices to be filled, together with the names of such officers, either written or printed upon a piece of paper, called a ballot. The ballots are usually printed, and are commonly called tickets, but the voter may alter such a ballot, if he chooses, before he deposits it. He gives his name to one of the judges, and at the same time hands him his ballot. A clerk examines the register, and informs the judge whether the person is registered as a qualified voter or not. If he is, the judge drops the ballot into the box, and both clerks write his name in the poll-books and check his name on the register, to show that he has voted.

87. **The Ballot Box** may be made of any material. It must have a lock and key to close the lid, and a slit in the top through which to drop the ballots.

88. **The Canvass.** — Counting and arranging the ballots, and counting the votes for each officer after the election is over, is called the canvass. This is done by the judges and clerks.

89. **The Returns.** — A statement of how many votes have been cast, and for whom, is called the returns. Such a statement made by the proper officers according to law is called the "official returns."

90. **Municipal Elections** are those at which the officers of incorporated towns and cities are chosen. They are held in the spring.

91. **School Elections** are those at which directors of school districts are elected, and other questions are decided. They are held in the spring. They are not always conducted with the same formality that the general election is.

92. **Special Elections** may be of either of the other three kinds. They are either ordered by authority, or provided for by law, to fill vacancies that may unexpectedly occur, or to decide questions of unusual or infrequent occurrence.

93. **Oath of Office.** — Every person elected to an office must either swear or affirm that he will faithfully perform its duties, and support the constitution of his state, and the constitution of the United States, before he can enter upon those duties.

94. **Other Matters Decided at Elections.** — The people may, at any election, decide other matters besides the choice of officers. For example, they may, in certain cases, choose whether the boundaries of their city, township, county, or state may be changed; whether special taxes

shall be levied, and for what purpose; whether the state constitution shall be changed, &c.

95. **Primary Meetings.** — Any voter may prepare his ballot independently of every other voter, and may also become a candidate for any office, if he chooses. But usually the candidates for the various offices are *nominated* at primary meetings. These meetings are sometimes called conventions, and sometimes caucuses. They are not required by law, but are held by such members of the different political parties as choose to attend. No person is expected to take part in the meetings of any but his own party. Each party procures printed tickets for its own candidates. These printed tickets are commonly used by all voters, but they may erase any name and add another in the place of it, if they choose to do so.

Section 2. Taxes.

96. **Necessity for Taxation.** — Money is necessary to pay the ordinary expenses of municipal, township, county, and state governments, and the salaries of officers. Also to erect public buildings, establish and repair roads, build bridges and school houses, support schools, &c. For this purpose taxes are levied in such a way that each one pays in proportion to the value of the property owned.

97. **How Taxes are Levied.** — An estimate is made, by the proper officers, of the amount of money required. They then sum up the estimates, made by the assessors, of the value of the property liable to be taxed. From these data they ascertain the percentage of tax that must be collected by the treasurer.

98. **How Taxes are Paid.** — It is the duty of every person owning taxable property to go to the treasurer and pay the tax. It is not the duty of the treasurer to demand it. People living in incorporated towns and cities have double tax to pay. In other words, they have the municipal tax to pay, in addition to the ordinary tax levied by the board of supervisors on the same property.

99. **Property Exempt from Taxation.** — United States property, state and county property, certain property of individuals, churches, school houses, and some other property are not subject to taxation.

100. **Road Tax.** — Besides the tax levied on property for road purposes, a poll-tax of two days work on the public road is required from every man from twenty-one to fifty years of age. It is the duty of the road supervisors to require this, or to collect an equivalent in money, which money must be expended in repairs of the road.

CHAPTER VI.

THE PUBLIC SCHOOL SYSTEM.

101. Object of the System.—It is the duty of the state to provide for the *free* instruction of all its youth of both sexes. For this purpose the law requires public schools to be established, to which all are admitted, between the ages of five and twenty-one years, and also that they shall be kept in operation at least six months of each year, and as much longer than six months in each year as the inhabitants may choose.

102. School Districts.—The whole state is divided into *school districts*, each civil township constituting such a district. School districts are divided into *sub-districts* for convenient arrangement of the schools, and to determine where the pupils shall attend. Cities, and incorporated towns of not less than three hundred inhabitants, may be organized as *independent school districts*, if the inhabitants desire.

103. School Funds.—The money for the support of the public schools of the state is derived from taxes levied for the purpose, and from several other sources. This money, and the school lands, also, are under the general management and control of the general assembly. But so far as the practical working of the school system is concerned, the money is under the control and management of the board of county supervisors and district directors in the various counties. The law provides that the school moneys shall consist of three funds, namely,—a *teachers' fund*, a *school house fund*, and a *contingent fund.*

104. The Teachers' Fund is derived from the following sources:—

1. Congress donated to the state for school purposes the sixteenth section in every congressional township in the state. That section is therefore often called the "school section."
2. Half a million acres of other land donated to the state for school purposes in 1841.
3. Congress also donates to the state for school purposes five per cent of the price received for public lands sold in Iowa.
4. The estates of all persons who die without will or heirs.
5. The clear proceeds of fines inflicted for breach of the penal laws of the state.
6. The proceeds of sales of lost goods and estrays.
7. All forfeitures in cases where unlawful interest is proved to have been required in the loaning of money.
8. Money paid by persons liable to, but exempt from, military duty.
9. A county school tax of not less than one mill, nor more than two and a half mills on the dollar, levied by the board of supervisors on the taxable property of the county.

105. **The Contingent Fund** is derived from an annual tax upon the taxable property of the county, levied by the supervisors. This is to meet the necessary expense of rent, fuel, repairs, &c.

106. **The School House Fund** is derived from special tax levied by the board of supervisors upon the taxable property of any *sub-district* in which a school house is needed, at the request of the board of directors of the district in which such sub-district is located. Such a tax cannot exceed one and one half per cent in one year upon the value of the taxable property of the sub-district. This fund is devoted to the purchase of grounds and the building of school houses.

107. **School Officers.**—The educational system of Iowa embraces the whole state. Its officers are, a state superintendent of public instruction, a county superintendent of common schools in each county, and directors of each school district.

108. **The Superintendent of Public Instruction** is elected by the people of the whole state at the general election. His term of office is two years. He is numbered among the state officers, and must have his office at the capital. He has general supervision of all the county superintendents, and of the common schools of the state. He must give a written opinion on matters pertaining to school law, to any school officer who may ask for it, and decide all cases appealed to him from the county superintendents. He must make a printed report to each general assembly at its regular session. In this report he must give a statement of the condition of the schools of the whole state, and also his plans for their future improvement.

109. **The County Superintendent** is numbered among the county officers of each county, and like them he holds his office two years. He has the general oversight of school affairs in his county, and reports their condition and progress to the superintendent of public instruction. Among his duties is the examination of teachers in the common branches, and the issuing of certificates to them, if their examination is satisfactory.

110. **Directors.**—Both township districts and independent districts are governed by directors. Each township district must have at least three directors to constitute the board, and one director in addition for every sub-district, more than three, that the district may be divided into. These directors are usually called sub-directors, because there is one elected from and by the voters of each sub-district, and because each sub-director has especial oversight of school affairs in his sub-district. Directors of independent districts are not called sub-directors, because their districts are not divided into sub-districts. Sub-directors are elected annually, in the spring. All boards of directors have the general management of school affairs in their districts. Tney make all purchases, employ teachers, de-

termine the place where new school houses shall be built, what number of schools, and what studies shall be taught, and how much longer than six months in each year the school shall be kept. They may establish graded schools. They must visit the schools and provide rules for their government, and require their observance.

111. **Independent School Districts.** — Directors of independent districts are elected by the voters of the whole district. Their term of office is three years. If the district has less than five hundred inhabitants, the number of directors is three. If more than five hundred, the number of directors is six. They possess the same powers that other boards of directors have, and also the further power to issue the bonds of the district for the purpose of raising money to build school houses.

112. **District Schools.** — It is the object of the school system to provide instruction for all youth in at least the common branches, namely,—orthography, reading, writing, arithmetic, geography, English grammar, history of the United States, and elementary physiology. In the majority of the schools of the state these branches only are taught. Such schools are commonly called "district schools," but any school board may grade its schools and add higher branches.

113. **Graded Schools.** — When schools are large it is necessary to grade them. The studies of all the branches, common and higher, are divided into grades, and the scholars are assigned to the classes in each grade according to their advancement. There is yet no established rule in the state by which grades are defined and designated. It is, however, becoming the custom to designate them as primary, intermediate, grammar, and high schools.

114. **High Schools.** — The law provides that there may be "county high schools" established, in certain cases, and a board of trustees elected to manage them, independently of the board of directors, in whose district the high school may be established. The high schools now established, however, are not usually of this kind, but have been organized by the board of directors in independent districts. These are among the city schools that have become so widely known for their excellence. The courses of study in these high schools often include, among other branches, the natural sciences, higher mathematics, and ancient and modern languages. The law contemplates that, so far as practicable, the high schools of the state shall form an intimate connection between the public schools and the state university. Some of the high schools have courses of study so arranged as to prepare students to enter the freshman class of the academic department of the university. This department then completes the public school system of the state.

115. **Teachers' Institutes.** — Teachers are constantly adding to their proficiency by experience, especially if they

have opportunities for the interchange with other teachers of ideas and plans for the improvement of their schools. For this purpose teachers' institutes are held, where lectures are delivered and the teachers discuss subjects pertaining to their profession. These institutes formerly received special encouragement and support from the state, but this is now unfortunately withdrawn.

CHAPTER VII.

THE STATE UNIVERSITY AND STATE AGRICULTURAL COLLEGE.

Section 1. *State University.*

116. **The State University** is located at Iowa City. It consists of four separate departments, namely,—the academical (or collegiate), the normal, the law, and the medical. The university is governed by a board of regents, who are elected, or designated, by the general assembly.

117. **The Academical Department** not only constitutes the crowning portion of the public school system of the state, but it is also the center around which the professional departments are clustered. Tuition is free in the academical department, each student paying only fifteen dollars a year for incidental expenses. By means of this grand system of instruction, any of the youth of Iowa may pass from the lowest grade of the common schools to a full collegiate education, all without the payment of any fee, except the university incidental fee before named. The degrees of bachelor of arts, bachelor of philosophy, and civil engineer are conferred in this department.

118. **The Normal Department.**—The work of this department is the instruction and preparation of teachers for the public schools, especially the graded schools. To the graduates of this department, after two years of successful teaching, the degree of bachelor of didactics is given.

119. **The Medical Department** consists of a medical college for the instruction of persons in medicine and surgery. Its graduates receive the degree of doctor of medicine.

120. **The Law Department** prepares persons for the profession of law. Upon finishing the full course of study they receive the degree of bachelor of laws, and are admitted to practice in any of the courts of the state, including the supreme court.

121. **Endowment.** — The permanent endowment of the university is derived from lands donated by the United States, and from other lands donated by the state. The first building of the university, now known as the "middle hall," was erected

by the United States, as a capitol for Iowa territory, and it afterward became the state capitol. When the seat of government was removed from Iowa City to Des Moines, the state donated this building, together with the ten acres of ground upon which it stands, to the university. The permanent endowment is not sufficient for its needs, but the general assembly, from time to time, makes appropriations of money from the state treasury to pay the necessary expenses, and to erect additional buildings as they are required.

Section 2. State Agricultural College.

122. **The State Agricultural College** is located on a large farm, near Ames, Story county. Many of the usual collegiate branches are fully taught at this college, but its especial object is "to teach such branches of learning as are related to agriculture and mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." It has two departments, the agricultural and mechanical. It is governed by a board of trustees, who are elected or designated by the general assembly.

123. **The Agricultural Department.** — In this department the leading studies have especial reference to agriculture proper, horticulture, stock-breeding, and the management of nurseries.

124. **The Mechanical Department** provides courses of instruction in mechanical engineering, civil engineering, mining engineering, and architecture.

125. **Manual Labor.** — Two and a half hours daily of manual labor are *required* of every student. For this, however, they receive stipulated wages.

126. **Students** all board at the college. They pay nothing for tuition and rent of rooms, and pay only actual cost for board, washing, &c.

127. **Endowment.** — The permanent endowment of the college is derived from a very large donation of land, made by the United States for that purpose. Besides this, the general assembly, from time to time, makes such appropriations of money from the state treasury as may be required for the erection of buildings, and for other purposes.

CHAPTER VIII.

SPECIAL EDUCATIONAL AND CHARITABLE INSTITUTIONS.

128. Charity a Duty of the State. —It is the duty of the state to make provision for the unfortunate. Therefore it has established institutions for the education of the blind, the deaf and dumb, and the orphans of soldiers. These are also charitable institutions, because the pupils are supported as well as instructed. There are also hospitals established for the treatment of the insane. All these institutions are governed by boards of trustees, appointed or designated by the general assembly.

129. Hospitals for the Insane. — There are two of these, one located at Mount Pleasant, in Henry county, and the other at Independence, in Buchanan county. It was formerly supposed, when persons became insane, that there was no reason to hope for their recovery, and they were usually confined in some private place that they might not harm themselves or others. Now insanity is regarded as a disease, and insane persons are treated with all possible care and kindness, as the sick are. By such treatment a large proportion of insane persons recover their reason and become useful citizens again. As it is not often possible to give them proper care and attention at their homes, the hospitals are established for this purpose, and not merely to serve as asylums where insane persons may be confined. The friends of the insane are expected to pay a part of the expense of their care and treatment. If they are not able to do so, this amount is paid by the county from which the patient comes.

130. The Institution for the Education of the Deaf and Dumb is located at Council Bluffs. Pupils between the ages of ten and twenty-five years only are admitted. They are permitted to remain at the institution seven years, if they commence soon enough to finish before they are twenty-five years old. They are taught the common branches, using the common printed books, and the sign-language also. Board and tuition are free to all pupils of the state.

131. The College for the Blind is located at Vinton, in Benton county. The institution is strictly educational. The school year is about nine months long. Pupils receive board and tuition free during the session of the school.

132. Soldiers' Orphans' Homes. — There are three of these homes, one at Davenport, one at Cedar Falls, in Black Hawk county, and the other at Glenwood, in Mills county. All youth, who are or who may become orphans of those who were soldiers in the union army in the great rebellion, are entitled to admittance. These institutions are schools as well as

homes, and the pupils receive instruction in the common branches. Thus the state provides as well for the children of those who were its faithful soldiers, as they would have been provided for, in most cases, if their fathers had lived to do it.

133. **Co-Education of the Sexes.** — In Iowa males and females enjoy equally the educational advantages afforded by the state. They are admitted on equal terms, not only to its public schools, but to all classes in all departments of its higher educational institutions.

134. **Other Schools and Colleges.**— Besides the public schools and institutions already mentioned, there are many other schools and colleges in the state. The people of some religious denominations prefer to have their children taught in schools that are under control of their church. The Catholics have many such schools. Several of the Protestant denominations have established colleges in the state. There are now twelve such colleges in successful operation.

CHAPTER IX.

PENAL AND REFORMATION INSTITUTIONS.

135. **Penitentiaries.** — Persons convicted of crime before the courts are often sentenced to be confined at hard labor for a greater or less number of years, according to the nature of the crime. To provide for the execution of such sentences, penitentiaries are established. Within strong enclosures secure cells are provided for the confinement of the prisoners at night, and workshops, also, in which they are required to labor by day. There are two penitentiaries in Iowa, one at Fort Madison, in Lee county, and another at Anamosa, in Jones county.

136. **Reform Schools.** — A large proportion of the criminals who are brought before the courts are found to have commenced a career of crime while they were yet children. It is much better to prevent crime than to merely punish criminals. Therefore reform schools have been established, to which such boys are sent as have commenced a career of crime, or who are unruly and vicious in their habits. This is, in part, a punishment for the offenses they have already committed, but mainly to reform them and make good citizens of them. They are treated kindly and taught the common branches of education. They are also taught useful employment, so that they may have less temptation to return to their vicious habits when they are released. There is yet but one of these institutions in Iowa. It is located at Eldora, in Hardin county.

QUESTIONS TO PART II.

CHAPTER I.

1. What is meant by the right of discovery?
2. What nation first claimed the land of Iowa by this right?
3. Who made the discovery? How and when?
4. To what nation did France cede it?
5. Explain the Lousiana purchase.
6. Did the United States recognize any right of the Indians to the land?
7. Name the territorial governments that have had jurisdiction over the land of Iowa, with the dates of each.
8. When was Iowa admitted into the Union as a State?
9. Where was the capital then?
10. Where was it removed to from there, and when?
11. Where is the capital now? When was it established there?
12. Were there probably other people living here before the Indians which the white people found when they came?
13. What evidence of it is found?
14. What tribes of Indians occupied Iowa at the time of the Louisiana purchase?
15. How many treaties have been held with the Indians to purchase the land?
16. Between what dates were these treaties held?
17. When were white people first permitted to settle in Iowa?
18. What is meant by the "Black Hawk purchase?"
19. What towns were first settled?
20. What was the population of Iowa when it became a state, in 1846?
21. What was its population in 1850, 1860, and 1870?
22. Where was the first railroad train run from in Iowa? When?
23. How many soldiers went from Iowa to the War of the Great Rebellion?
24. About how many Post Offices were there in Iowa in 1870?
25. How are Post Offices established, and Postmasters appointed?

CHAPTER II.

1. What constitutes the supreme law of the nation?
2. Name the branches of the United States Government.
3. What does the Legislative branch consist of?
4. How many Senators and Representatives from each State?
5. In whom is the Executive branch vested? His term of office?
6. In whom is the Judicial branch vested? Their term of office?
7. How are they appointed to office?
8. What is the Constitution of a State?
9. What must be done before a new State can be admitted into the Union?
10. What is meant by the "old Constitution" and new Constitution of Iowa?
11. When was the old changed for the new?
12. When was the word "white" stricken out of the Constitution? Why?
13. What is the "Bill of Rights?"
14. What is the right of suffrage?
15. Name the departments of the State Government.
16. What is the object of the Legislative department?
17. What is the General Assembly? What does it consist of?
18. How often, and when, does the General Assembly meet?
19. What is the term of office of Senators? Of Representatives?
20. How old must Senators be? Representatives?
21. Who is the presiding officer of the Senate? Of the House of Representatives?
22. What is a bill? How does a bill become a law?
23. In whom is the executive power of the State vested?
24. Who are eligible to the office of Governor?
25. How is he elected? His term of office?
26. What are his duties?

27. State the eligibility, term of office, and duties, of the Lieutenant-Governor.
28. Name the other officers of State and their terms of office.
29. Explain the duties of each.
30. What comprises the Judicial department?
31. Name the officers of the Supreme Court.
32. How are the Supreme Judges elected? Their term of office?
33. What are the functions of the Supreme Court?
34. Explain the duties of the other officers of the Supreme Court?
35. What are judicial districts?
36. What is the difference in the business of the Circuit and District Courts?
37. Name the officers of these Courts respectively. Their duties.
38. How are United States Senators elected? Their term of office?
39. How are Representatives in Congress elected? Their term of office?
40. What are congressional districts?
41. Who constitute the militia of the State? For what purpose?
42. Who may be exempt from military duty? How?

CHAPTER III.

1. How many counties in the State?
2. What gives them their commonly rectangular outline?
3. What is a county-seat?
4. What is the Poor House?
5. Name the county officers and their terms of office.
6. Explain the duties of each officer.
7. How are Notaries Public appointed? Their duties?
8. What are civil townships?
9. Name the township officers and their terms of office.
10. Explain the duties of each officer.
11. Into what classes are cities divided?
12. Name the officers of a city of the first class. Their terms of office.
13. Explain the duties of each officer.
14. Name the officers of a city of the second class. Their terms of office.
15. What are incorporated towns? Their officers and terms of office?

CHAPTER IV.

1. What is a municipal government?
2. How many classes of cities are there, and how divided?
3. What is a city of the first class?
4. Explain the duties of the mayor and council of a city?
5. What other officers constitute a city government?
6. How does a city of the second class differ from a town.

CHAPTER V.

1. Name the different kinds of elections.
2. What officers are elected at the general election?
3. Describe the manner of holding the general election.
4. What is the ballot-box? The canvass? The returns?
5. What are municipal elections? School elections? Special elections?
6. What is the oath of office?
7. What other matters may be decided at elections?
8. What are the primary meetings?
9. Why are taxes necessary? How levied? How paid?
10. What property is exempt from taxation?
11. What is road tax? Who must pay it?

CHAPTER VI.

1. Who are entitled to instruction in the public schools?
2. How long in each year must all schools be kept?
3. Explain the organization of school districts.
4. Under whose control are the school funds?
5. How is the general school fund divided?
6. Whence are the school funds derived?

7. Name the school officers. Their duties and terms of office.
8. What are "district schools?"
9. How are graded schools divided?
10 What are *county* High Schools?
11. What are Teachers' Institutes?

CHAPTER VII.

1. Where is the University located?
2. Name its departments.
3. What degrees are conferred?
4. How is the University supported?
5. How is it governed?
6. Where is the Agricultural College located?
7. Name its departments.
8. What is its especial object?
9. What rule concerning labor of students? Their board?
10. How is the College supported?
11. How is it governed?

HAPTER VIII.

1. Name the charitable and special educational institutions of Iowa.
2. Where are the Hospitals for th Insane located?
3. What can you say concerning the treatment of the insane?
4 How are the expenses of the patients paid?
5. Where is the Institution for he Deaf and Dumb located?
6. Who may be admitted?
7. How are their expenses paid?
8. Where is the College for the Blind located?
9. Who may be admitted? How are their expenses paid?
10. How long is their school year?
11. What are the Soldiers' Orphans' Homes? Where located? Who may be admitted? What are they taught?
12. Are males and females admitted equally to all classes in the State institutions?
13. What can you say of other educational institutions in Iowa?

CHAPTER IX.

Where are the Penitentiaries located?
How are they constructed? What are they for?
Explain the purpose of the Reform School.
Where is it located?

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